

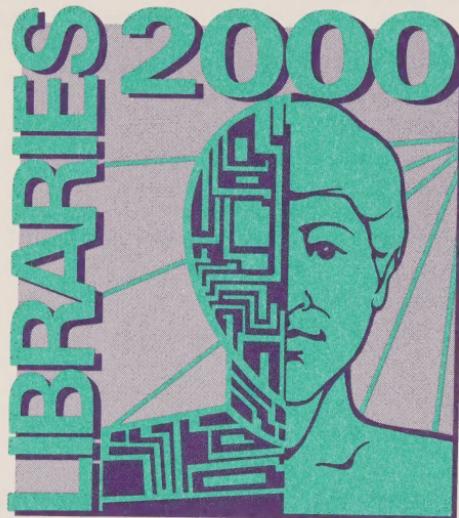
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FUTURES SYMPOSIUM

PROCEEDINGS

A FUTURES SYMPOSIUM



LIBRARIES 2000: A FUTURES SYMPOSIUM ON THE LIBRARIES OF THE FUTURE

PROCEEDINGS

TORONTO 1985

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THE ONTARIO MINISTRY OF
CITIZENSHIP AND CULTURE

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The transcripts have been edited for clarity and coherence. Every effort has been made to maintain the text of the presentation.

The views expressed by the conference speakers are not necessarily those of the Ministry of Citizenship and Culture.

INTRODUCTION

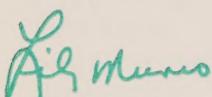
The milestone of a new century is only fifteen years away. According to some analysts, we are in the most potentially destabilizing wave of developments. Perhaps most profoundly affected will be those institutions involved in information services in an era when new technologies for collection, storing and distributing information are changing society and our lives at a speed our institutions can hardly accommodate.

It is quite appropriate, then, to take stock of our situation as library trustees and administrators, to examine the dramatic implications of the electronic age we have embarked upon and to gauge the place public libraries may have in the future world of an information economy.

During the public library program review the library community collectively examined ways of enhancing its programs and services. This review and the many recent initiatives undertaken by my department have set new directions with considerable promise. **Libraries 2000: A Futures Symposium** continued this planning strategy, by examining longer term trends and developments to allow us to manage rather than simply respond. To manage our way into the future requires planning and planning requires prediction. **Libraries 2000: A Futures Symposium** revealed, however unclearly, the future of our society and of information technology.

The challenge before you now is to plan for future library service in your community. **Libraries 2000** gave us the forecasts; now you must consider how these predictions apply to your community and your library.

These proceedings of the conference have been produced to help you in this task. I am confident that you will be prepared to meet the twenty-first century.



Lily Munro
Minister



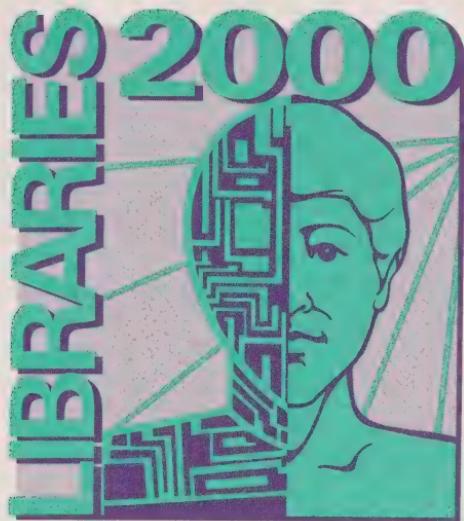
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OPENING CEREMONY



LIBRARIES 2000
INTERNATIONAL CONFERENCE
11-13 JUNE 2000
UNIVERSITY OF TORONTO LIBRARIES
UNIVERSITY OF TORONTO

WELCOME



WIL VANDERELST
DIRECTOR
LIBRARIES AND COMMUNITY
INFORMATION BRANCH

It gives me great pleasure to welcome you to **Libraries 2000: A Futures Symposium**. My first duty, indeed a very pleasant task, is to introduce The Honourable Lily Munro, the Minister of Citizenship and Culture, MPP for Hamilton Centre, the Minister responsible for public library service in Ontario. A very cordial welcome, Dr. Munro.

MINISTER'S MESSAGE



LILY MUNRO
MINISTER OF CITIZENSHIP
AND CULTURE

Thank you very much. I am delighted to be with you this morning for what I can see is going to be a tremendously successful conference, with people I am increasingly relying on for contributions to the lives of our children and our children's children.

I have always had a deep and abiding respect for librarians and for the boards that work so closely with them. And I want to tell you that I am delighted that we have a branch within our Ministry that is playing such a dedicated and committed role in Ontario, with the co-operation of each one of you. So I am delighted to be with you to kick off **Libraries 2000: A Futures Symposium**.

I can see that you are in for an information-packed day, and I am certain that you will discover many provocative and insightful glimpses into the future. I know that because of your professionalism and your inquiring minds, the prerequisites of your profession, you will use your creative imagination to the fullest. If the Chairman and guest speakers entertain even the slightest idea that you are an apathetic audience, they are in for a surprise.

It is a particular pleasure for me to be with you. This is one of the first opportunities I have had to be with members of the library community as a whole. I met some of you last night, and I hope that as I travel throughout this great province and visit your communities and your libraries, we will get to know each other a little better.

I would like to bring official greetings from the Premier of Ontario, David Peterson. His three children are certainly taking part in all the things libraries have to offer, simply reading books, which is not so simple, or taking advantage of many of the visiting artists and puppeteers who come to libraries. My young son, Johnny, is six and a half and is taking

French immersion. He just loves librarians and books. These are two very real examples in addition to your own children who view you as good role models. I am aware of the immense value of your work. I have spent a good part of my life in libraries, as a student, researching, and as a mother. The excellent public library in Hamilton plays a large part in opening up the world of reading and imagination which is so important to my own son.

In my previous position as Director of the Centre for Continuing Education at McMaster University, I was very much aware of the possibilities and opportunities that libraries provide for lifelong learning. This is so important when we look at career shifts and challenges, and the changing factors in the world of work and recreation.

I share with you a deep conviction that we must continue to build our library service and undertake initiatives like this conference that will enable us to face the considerable challenge of the future.

Further, I want you to know that I believe in the essential role that libraries play in each community. Libraries act as a fundamental information source and as an integral part of the cultural fabric of the communities they serve. It is my view that culture is society's most effective instrument of communication. Culture is the historic link from one generation to the next. Culture is also the closest link among peoples. It is most appropriate that my Ministry, the Ministry of Citizenship and Culture, combines this concern for culture with a concern for multiculturalism. And this is where the library comes in. The library, as a repository of the human record of our culture, is a powerful institution to encourage people to understand themselves, their community and their world; and to appreciate the special needs of youth, seniors, handicapped and the illiterate.

You are proud, and rightly so, of what has been accomplished in your own communities. The record of library service in this province is truly impressive. This is evidenced in the fact that 99.5 per cent of Ontario residents have access to library services. I believe that it is primarily the energy, enthusiasm, dedication, knowledge and skill of library trustees, administrators and staff, that have brought us this distance.

However, we must not be complacent. It is essential to build on a strong foundation with a clear vision and an eye to emerging trends. My Ministry's aim, which I am certain we all share, is to ensure continued access to library service, as well as to enhance the quality of that service, a service responsive to community needs and social change.

I think that it is also appropriate that librarians be recognized for the ability and inventiveness they bring to their work. I believe that the public should be made aware of the valuable contributions librarians make to their profession and to their communities.

I am, therefore, pleased to announce the creation of the Innovative Librarianship Award, sponsored by my Ministry. We will be asking library boards throughout Ontario to nominate examples of excellence and innovation in public librarianship.

This year, in recognition of United Nations International Youth Year, we will be looking for creativity and resourcefulness in library services for our youth. My Ministry's intention is to expand the award categories in coming years to cover a variety of library endeavours, such as management, technology, research, programs, cultural activities and library design.

Through this ongoing program, important and creative advances in library service can be recognized and shared by the library community. I am certain that the Innovative Librarianship Award will become a sought after, prestigious recognition in the library profession.

Professionalism is so important. It is a status we all seek in our chosen careers. I am aware of concerns among the library professionals that the designation "librarian" and the Provincial certification scheme have been deleted from the Public Libraries Act 1984. You can be justifiably proud of your profession. It has a long history of participation in the cultural and educational traditions of our society. You incorporate in your profession at some time during each day the work of a business manager, an educator, a personnel consultant, an information specialist and a community activist.

No matter what hat you wear at different times, as librarians you bring to your task a combination of talents, training and experience rare in our social institutions. I believe that libraries, to fulfill their mission, should be directed by individuals who are trained to meet the variety of challenges you will be discussing today.

I am certain you have appreciated for some time the complexity of this problem. In Ontario, library resources include a vast range of expertise, from caring volunteers to the sophisticated expertise of professional librarians. Each may well meet the needs of the respective community. I believe that the issue of training and development must continue to be a priority, and that each of you, librarians, administrators and staff, must be motivated in such directions with an eye to developing reasonable and workable options. These options must meet the needs of variously defined communities and of libraries in those communities and must have the total support of all members of those communities. Those are some of the challenges you face.

I want to assure the library community that my Ministry is committed to supporting a review by the Ontario Library Association, in conjunction with the Ontario Public Librarians' Advisory Committee, to find an acceptable and functional approach that will meet the continuing education needs of librarians. Once we have examined the issue in greater detail, we can proceed more competently on this matter. I look forward to the conclusion of this review by the library community, and I hope that you will embrace this idea.

Technological changes will dramatically affect the way we do business. They will affect society in general and, more specifically, the communities in which you operate and the nature of librarianship. The challenge to

libraries in the wake of the Information Revolution with its proliferation and complexity of information is to provide new structures of access to knowledge in a variety of new formats. At the same time, libraries must continue to preserve, manage and make available information in the traditional printed format. The implications of technological change are a major factor in your future planning. Librarians who plan for these changes now will be able to use the technology instead of being used by it. For this reason my Ministry has acted in assisting libraries to adapt to that change.

One way we are assisting libraries is through a \$ 1.3 million province-wide telecommunications project. The program begins with a pilot project in the Ontario Library Service Escarpment Area involving a computerized telecommunications system that will make it easier for libraries to share resources. I will be officially inaugurating the pilot during my visit to the O.L.S. Escarpment in Hamilton next week.

Twenty-six libraries from the Peel to Niagara regions are participating in the pilot project. The system ties together libraries of varying sizes in diverse geographic areas of the regions, and allows them to share print and non-print resources through access to on-line data banks and electronic mail. If we find the pilot project successful, we will endeavour to expand the system through the Ontario Library Service Boards across this province.

Libraries cannot develop as cultural institutions providing activities related to education, information, recreation and personal development without ongoing co-operation with each other. This pilot project will lead to a total system of library service throughout this province, and marks Ontario as a leader in network development. Networking carries with it an increasing reliance on technology for the transfer of information; miniaturized microcomputers and electronic technology have developed rapidly to allow application to library functions with such advantages as speed, compressed storage and quick retrieval of information.

To enable smaller libraries and communities of under 50,000 access to these technologies, specifically the implementation of automated systems and the creation of data bases, I am pleased to announce the Automation Program for Small Libraries. This program will provide funding for up to 80 per cent of computer hardware and software costs, and/or the costs of building a machine-readable data base to a maximum of \$70,000.

Funding for feasibility studies will be provided of up to 80 per cent to a maximum of \$6,000 for each board. I am confident that this program will enable many smaller libraries to make full use of new technologies and to become an integral part of a province-wide public information utility or network.

I understand that the Library Cooperative Automation Program, introduced in 1984, has been incredibly successful in developing a variety of local public library networks in Southern Ontario. Since the program's announcement, one million dollars in grants have been awarded. This program has been extended, with an additional \$500,000

allocated for this fiscal year.

I understand that the public libraries in Northern Ontario are not able to use a program that emphasises close co-operation between neighbouring communities. I recognize that distance and sparse populations make joint automation projects economically unfeasible in Northern Ontario.

For this reason, I am also announcing the creation of a Northern Libraries Automation Program. It will assist libraries in Northern Ontario to develop computer hardware and software, as well as create data bases, without the prerequisite that these efforts be undertaken in co-operation with another library.

I think you will agree that these kinds of initiatives will contribute greatly to the future of library service in Ontario. That is not to say that my Ministry will ignore more traditional areas of library service. Library trustees and their staff must remember that libraries exist to serve the users. In addition to taking the lead in technological advances, libraries have to grow and be community centered.

How well the library carries out its mandate of social responsibility will justify its existence as a resource and will directly affect public perception and support. If technology has any use, it is to ensure that all members of society have access to information, not just individuals with economic, educational or geographic advantages. The library as a key information resource can provide powerful ammunition in the fight for equality.

Unique opportunities exist to provide leadership in ways only available to libraries with their channels through which knowledge can be spread without prejudice or bias. This means serving those individuals who would otherwise lack the information resources to deal with the evermore complex modern culture and expanded quantities of information.

One area of specific concern to me as an educator and as a politician is the level of illiteracy in Ontario. While we may admire the miracle of the microcomputer, we also need to realize that one in five Ontarians can be defined as a functionally illiterate adult, that is, not able to read signs, fill out applications, read medical prescriptions or participate fully as a citizen in our society. We take reading for granted. But imagine being unable to read a good novel, being denied the pleasure of reading bedtime stories to our children.

Ironically, it may have been the computer and its requirement of sufficient reading skills that further highlighted the seriousness of the illiteracy problem. The cost in human misery, as well as in lost productivity and inefficiency, is too significant to be ignored.

I am, therefore, pleased to announce the extension of the Literacy Pilot Project funded by my Ministry at the Owen Sound Public Library.

Additional funding will make it possible to develop further pilot projects in various parts of Ontario, and to deal with illiteracy in the French-language and native communities. These projects will emphasize the teaching of literacy skills by volunteer tutors trained by professional teachers, as well

as the promotion of public awareness of illiteracy at the community level. Based on these pilot projects, we will develop learning and promotional materials to enable local libraries to undertake literacy programs without duplicating the efforts of others. I am very pleased that a number of you already are undertaking literacy training programs. I hope that this initiative, together with such recent efforts as the Canadian Business Task Force on Literacy, can be the beginning of a concerted public effort, with public libraries playing a significant leadership role.

In conclusion, I wish to leave you with one final thought. It is my firm belief that libraries will continue because society needs them. As you will no doubt hear today, libraries obviously have to change to take advantage of a rapidly advancing technology. Equally important, libraries need to closely involve the community to determine its needs. The marriage of the local wisdom provided by the community and the expertise provided by librarians will result in a public library that will not only survive, but will thrive as a fundamental and relevant part of a community's cultural life.

OPENING REMARKS



LISTER SINCLAIR

Lister Sinclair's urbane, articulate radio and television presentations are well known. His work in these media has been recognized with many national and international awards. He is especially well known for such CBC programs as "Man at the Centre" and the "The Nature of Things". He currently hosts the CBC radio series "Ideas".

You are custodians of time machines, as Ray Bradbury pointed out, and I think it is, therefore, valuable to talk with librarians about the future.

I want, however, to recite a little list of non-subjects which arose from preliminary meetings we have held. I hope there will be very little reference to marketing, to the problems of privacy, censorship, and copyright, and even perhaps to the problem of illiteracy.

You will, I think, hear quite a lot of talk during the day about information. I must warn you that many of the speakers use the word information in a way perhaps slightly different from the way in which librarians use it. I think you divide some of your activities into information and fiction, just as we in broadcasting, certainly in the CBC, divide our activities into information, entertainment and enlightenment. Enlightenment is the tricky one. That is the one we are really all after. But when these speakers talk to you about information, they will probably be putting it in the context of information theory. That is, "information" is any attempt to get a signal from me to you, and anything that comes inbetween is called "noise". "Information" and "noise" are words that I am sure you will be hearing quite often during the course of the day.

A FORECAST OF LIFE INTO THE 21ST CENTURY



A FORECAST OF LIFE INTO THE 21ST CENTURY



DR. MARVIN CETRON

*Marvin Cetron, who has degrees in industrial engineering, economics, research and development management, is a pioneer and expert in the area of technological forecasting and assessment. He is the President of Forecasting International, Arlington, Virginia. With two books to his credit **Encounters with the Future** and **Jobs of the Future**, he is now working on **Schools of the Future** and **Women in the Twenty-First Century**.*

I am not a "futurist". Futurists want the world to be a better place. They want the rich and the poor to get closer together and rich and poor countries to get closer together. They want everybody to love everybody. They are Utopian in their thinking. That's fine. As a person, I am a futurist. As a professional, I am a forecaster. A forecaster takes all ideas through a three-step process. Ideas must be technically feasible, economically feasible, and socially and politically acceptable. If one of those things doesn't take place, the idea is not going to happen.

If you talk to futurists, the first thing they tell you is, "We need solar energy. It's clean, inexhaustible, non-radioactive. There's no radioactive waste, and this is the way we have to go, right?"

Wrong. It doesn't work that way. Sure, it's technically feasible and there is no question that it's socially and politically acceptable. But there is no way that it is economically viable. It costs the equivalent of between \$48 and \$54 U.S. per barrel to make solar energy economically feasible. Oil will not hit \$40. It just won't. Therefore, solar energy is not going to be developed.

Now, you can say, "Why isn't oil going to hit \$40?" The reason is simple. There hasn't been an OPEC since the end of 1974. When the world conserves — and it has been conserving — we have more than enough energy. Saudi Arabia can produce enough energy, at the margin, to take care of the whole world's needs. It is important to understand that.

Now, with that in mind, the question is, "Why isn't oil going to hit \$40?" The reason is pretty simple. Because there is enough energy coming out now, and there has been a glut on the market for nineteen months.

The reason Saudi Arabia is producing all the oil is pretty simple. Take a look at Iran and Iraq. Here you have a major war going on for over five

years, yet you are still getting 58 per cent of the oil out of Iran. Out of Iraq and Basra comes 53 per cent of the oil. It doesn't make any difference. We have more than enough oil at the present time.

The point, very simply, is that this doesn't make any difference in the price because Saudi Arabia controls the price. There are three good reasons for this. One, Saudi Arabia has \$9.2 billion invested in the United States economy. They can't go up more than one-half our inflation rate, which is less than four per cent, or they devalue their dollars and their holdings in the States, and that would be stupid.

The second reason is that they don't want to be an oil pump after the year 2010 or 2015, when fusion comes on-stream. They are trying to realize what they can right now, so that they will be prepared in their own country.

They took long-term industrial development loans lasting from 1974 to 2004. They have to keep paying those bills, both debt service and the principal. They have been doing this. But in 1983, they fell behind by \$1.2 billion; in 1984, they fell behind by \$873 million. What do they do when they fall behind?

Well, they have to pay their bills, so they pump out more oil. When they pump out more oil, what happens? The price drops. When the price drops, what do they do? They pump out more oil. It is called Catch-22. They keep it up and the price keeps dropping. It is the best thing that ever happened to us.

The truth is, the price will be down to less than \$25 a barrel by the end of this year, and down to \$17 next year. You probably heard, a couple of days ago, that Sheik Yamani said oil would go to \$18 a barrel. Where did he get that number from?

Oil only costs about \$1.39 a barrel, and that on top of the margin. It costs the equivalent of \$16 a barrel to get oil out of the North Sea. If it costs \$16, they can sell oil for \$17 and sell all they want. Obviously, it has to come down to that kind of price to make it worthwhile for someone like Sheik Yamani to sell the oil. So, you can figure that oil prices are going to drop, not go up. We have been saying that for years.

The third reason that oil prices are not hitting \$40 is that once you get close to the equivalent of \$40 a barrel, solar energy, wind energy, geothermal energy, shale oil, synthetic fuel, gasohol and the whole business become economically viable. Look, Sheik Yamani went to the Harvard Business School. He got good grades. Oil is not going to get close to \$40 a barrel.

Look at the data yourself. Don't listen to everything you read, even though it appears in the library. Newspapers have a habit of taking what they want, and they are conspicuous for the absence of data. Television is not much better. Use the information yourself and look for data.

I am going to give you some background now on the overall environment, on what's going to happen, and the implication for libraries.

When I started out in this business, in 1948 at a school called Penn State, I had a professor from Britain. His name was Professor Jeffries and he came out after the war. He said, "There are four key words you had better learn. Without these words, you are not going to make it in the United States. You are going to end up as bad as Britain is."

Those four words are still important today. The words are “innovate”, “automate”, “emigrate” and “evaporate”. He was talking about the basics. He said that the first thing you have to do is make sure your people’s personal goals are corporate goals. The second thing is make absolutely sure that people are willing to build on each other’s strengths, not weaknesses. We’ll all be better off.

Then he said some things that were heresy for an industrial engineering professor in 1948. He said, "Make sure your union workers cross over union lines, and improve productivity, then give them a percentage of the profits. Make them part of management." That was crazy at that time. Today, we would call it "motivate". At that time it was called "innovate".

He said that if you can't innovate, you had better automate. By "automate", he meant numerically controlled equipment. Today, this has changed. Now we are talking about robotics, computer-aided design and computer-aided manufacturing. We are talking about one robot that works around the clock and replaces six workers.

You're going to say, "Why are we going to robots? Why don't you keep all six people working?" Obviously, we haven't got much choice, because the Japanese went robotic. They went robotic, by the way, to replace the 20 per cent of their population that retires between 1985 and 1990 at 80 per cent of their base pay for the rest of their lives. They had no choice but to go robotic.

The big thing when you go robotic is not to go strictly because of productivity, although that helps. Go because you don't get 15 per cent scrap when you go robotic. You get less than one per cent scrap.

When a robot paints an appliance or a car, only 60 per cent as much paint is being used. When you are dealing with dimensionality, you are not dealing with $1/64$ of an inch, or $1/32$ of an inch, you are dealing with $1/1,000$ of an inch. The parts actually fit.

In the United States — I can't talk about Canada — the car we produce best is called a "Wednesday car". On Monday, the workers are hung over from the weekend, and the work looks like it. On Friday, only four of the five bolts go on, because they are in a hurry to leave for the weekend. The best car we produce in the United States is on Wednesday. But the car built by a robot is nine times better than a Wednesday car.

Now, I know the unions will say, "Yes, but when you use the robots for welding, they use one-third more welding rods." They do, but that's because the robots weld everything. The people weld two-thirds of the welds, and the cars fall apart. Robots do it better.

What does that mean in terms we can understand? In 1980 a robot cost \$150,000. In 1982, the average robot with binocular vision, two senses that give depth perception, only cost \$102,000. At the end of 1984 and the beginning of 1985, the average robot that could pick up things from 1/16 of an ounce to 350 pounds costs \$35,000 and replaces six workers if it works around the clock.

Let me give you an example. My son is getting his doctor's degree at the University of Utah in about two months. He uses a robotic arm, an artificial limb. He uses biofeedback and a microchip to move the Utah arm. He has it connected with a Stanford hand and an MIT finger.

It will do anything. It can pick up a roll of quarters and turn one quarter over at a time; it can flip a quarter up in the air, catch it and turn it upside-down in your hand. He can deal a deck of cards with it or he can take an egg out of the egg carton, crack it, put the shell away, beat up the egg with two fingers and cook it.

We are talking about something that is being used today to replace the human arm. I am talking about what is going to be available on the shop floor by the year 1990. That robotic arm, with more capability than the bionic arm I am talking about, will cost less than \$5,000 by 1990 and will replace six workers. That is less than the medical portion of the fringe benefit costs of one automobile worker in the United States.

This has tremendous implications for our manufacturing capability. We have to retrain our workers. They are not being retrained for the proper jobs, either in the United States or in Canada. We are going to a high-tech service industry, and we are not even aware of it. We don't even know what the implications are. You don't need strength or brawn or skill on a factory floor any more. You need word-processing skills. I'll come back to that in a moment.

Professor Jeffries also said, "If you can't innovate, then you had better automate. If you can't innovate and you can't automate, then you had better emigrate. Go overseas, manufacture overseas, move offshore." That has been going on for some time.

Eventually, even with protective tariffs, that's not going to help. Companies are going to come back to the United States or North America. That's not a problem, because when they come back to the United States, they'll get the same rotten workers we have here, so we can compete.

In 1948, that meant "Hire a good lawyer and make money when you go out of business." That's not true any more. Now you sell to the union, and let them go out of business. It takes them six more years, but that's what has been happening. I am talking about steel, textiles, rubber, railroads and automobiles.

In the States, in 1900, 70 per cent of our population was working on the farms in agriculture. In 1980, four per cent of our population worked in agriculture. By the year 2000, it will be 2.3 per cent. We will lose 15 per cent of our small farmers. People making less than \$40,000 a year will

lose their jobs and their farms as well. But 97 per cent of people currently on farms have at least one spouse or one member of the family working off the farm for non-farm income. Still, they are going to lose the farm.

We will have a 350 per cent increase in productivity. I am talking about cloning. It is now possible to take an ovum from a prize heifer, cut it in half and get two prize heifers, each of which has 25 per cent more beef. That is happening today.

I am talking about gene splicing for corn, alfalfa, wheat, the whole business. By splicing genes into the actual crop, it can be grown with only 80 to 90 per cent of the water it would otherwise require. It is also 100 per cent more disease-resistant. That is not a low-technology industry, as agriculture is said to be. Growing watermelons in square boxes so they are easier to ship is not low technology either. We are using salt water, not desalinated water, to grow crops in places like New Mexico, Arizona, Nevada, southern Utah and northwestern Texas. That area used to be a wasteland. Now the land can be used to raise cattle. It is too salty for people, but it's not too salty for cattle.

These are major changes in a low-technology industry. Because of what is going on in robotics, we're going from 23.6 per cent of the population working in manufacturing in the United States in 1980, to 9.7 per cent by the year 2000. Less than 10 per cent. This means that 88 per cent of the population will be working in the service sector. No, we are not going to sell insurance to each other. Half of that group, 44 per cent of the population, will be servicing the heaters, the air conditioners, the heat exchangers, the cars, the cable TV, the radios and the interactive VCRs.

The other half of that service is information. Lister Sinclair brought this up earlier. This is what you are in. The difference is very simple to see. The post office in the United States always thought it was a communicator. It is not a communicator. AT&T is a communicator. When you talk to each other, that's communication. The postal system in the United States is a materials handler. And the post office is just an example. When you are handling books, giving them out and getting them back, that's materials handling. If you are talking about getting information across, that is the business you are in.

Any librarian who does not become computer-literate within the next five to six years will lose his job. I'm not saying that's nice; I'm saying you're not going to make it without that ability.

The average engineer in the United States, and I think in Canada too, has a half-life of five years in engineering. That is, after five years, 50 per cent of what he has learned in engineering school is on the computers. In ten years, 90 per cent of what he has learned is on the computers or has been changed. When I graduated from engineering school in 1952, they gave me a bible called **The Materials Handbook**. It gives details on hardness, collapse strength and tear strength, all the information about the materials you want to use. It tells you what you are going to use for compressive strength, what material to use for what application.

But the 1975 **The Materials Handbook** is 90 per cent out of date. The automobile, like the little Pontiac Fiero that is being made in the United States, is now made of 37 per cent plastic steel. Manufacturers are using some titanium and a little bit of aluminum. They are not using steel any more. And by 1988, 59 per cent of the car by weight will be plastic as opposed to steel. In 1992, 92 per cent of the car is going to be plastic. So steel is a dead industry. We should be glad to get rid of it; we don't need it. Everyone is fighting to keep it. They say, "Whenever we have a war, we are going to need that kind of capability." But we don't need the stuff. The point I am trying to bring out is that various industries are dying. That's just one.

The Materials Handbook was considered a guide. When I spoke to the engineering associations, we generated these numbers and took a look at it. And when I spoke to 22,000 doctors at the American Medical Association and the American Health Association in Denver, a fellow came up to me and said, "I am responsible for the computer in Bethesda, Maryland, the National Medical Records Information. All the data for all the computers in the United States and throughout the world is in this computer, all the latest medical information. In less than five years, between 80 and 90 per cent of all the medical information is outdated. If your doctor hasn't gone back to school in less than five years and he's not teaching at a medical school, he is treating you with 10 to 15 per cent of all the information available in medicine, and that's all."

"And by the way," he said, "eighty-five to ninety per cent of you people in the research organizations never call me. I know who calls. You are dealing with people's lives. You are fooling around over here. You've got to go back to school."

That is what is happening in real-time information. The information is being put into the computer, and nobody is using it. It's like the books that are on your shelves. Nobody picks them up; they're collecting dust. We cannot afford to collect information and not use it.

We had a major breakthrough in our military in 1975. We could pick up every single telephone call going overseas with special machines. Because every telephone call that didn't use a land line going into the ocean was using satellites. We could pick up the conversations, and out of these conversations we could pick out so many hundred keywords. If a keyword was being used in a sentence, the whole sentence was dictated, converted into English and typed. A message with the phone number of the caller was given to the FBI and the message and the number being called was given to the CIA. That was in 1976. It was using scramblers and another special thing in the spy department.

The big thing was that in 1981 we had a breakthrough in the United States. Three of our major corporations had machines you could talk to without scramblers; you could read 6,000 words into them. For four and a half hours, you read those words in context. Then you dictate to the machine and it types up 92 per cent of what you have said accurately. If

you correct the words you've slurred, when you've coughed or taken a breath, it will type 97 per cent of what you have said accurately, correct your spelling and grammar, and tell you you have a noun and a verb, a subject and a predicate. One of the corporations has a way to convert it into British English and change the spellings.

These things exist today, to the point where I can push a button and have the information converted into one of nine different languages, including Hebrew, which is written from right to left, and Chinese symbols, written sideways. You take it out of the machine, turn it 90 degrees and read down the columns. These things exist today.

No, we can't type idiomatic expressions at the present time, but we can convert them. It is a word-for-word translation. If you say, "The spirit is willing but the flesh is weak", it comes out and says, "The wine is fine, but the meat is rancid". The point is, the machines exist.

What does that mean in the United States in 1990, when roughly one-third of our major corporations will be using these machines, and one-half of our typists and stenographers won't be getting jobs? Where are these people going to go, when a machine can type what you are saying?

They will end up in the factories: 20 per cent of our blue-collar work-force in the States in the 1990s will be female. They will be controlling robots, computer-aided design and computer-aided manufacturing, because word-processing skills are required for this work.

When I first gave this information to a director of production in an automative factory, he said, "My God, that's a marvellous thing, to have that many people come into that factory. It will be a female job so I can lower the salaries 20 per cent." The man has an elevator problem. His elevator doesn't go to the top.

Let me give you some demographics for the States. In 1983, 50 per cent of both spouses worked full time. By 1990, 65 per cent of both spouses will be working full time. By the year 2000, 75 per cent of both spouses will be working full time. The only way you'll be able to make it is with two incomes. You'll only be able to survive with one income. It will take two incomes to make it.

There is a blurring of sexual roles. There is no such thing as a female job any more in the States. By the year 2000, the only job a woman won't be able to get will be the job of a Catholic priest. Every other job will be available. It's happening right across the board. You've got to go back and get retreaded. Any young woman in the United States who expects some guy to come on a white horse, carry her off and take care of her for the rest of her life is one person away from being on welfare. Fifty per cent of those young women are going to get divorced, 60 per cent if they live in California.

You have to be retrained. This is crucial. High technology is a great equalizer. It makes those things happen. So, we're talking about social change, as well as technological and economic change.

The jobs I am talking about are completely and absolutely different from the ones we had before. Our Department of Labor is completely out of touch. It publishes a book called **Dictionary of Occupational Titles**. "Tea taster" is in there, but not robot technician, laser technician, computer-aided design technician, computer-aided manufacturing technician, hazardous waste disposal technician, housing rehabilitation technician, telemarketing, CAT scan reader, geriatric social worker, paramedic, emergency medical technician. None of those people need more than two years after high school, at most.

We have to get back to high-tech vocational education. In the United States three-quarters of our people do not get a college education. We have to have high-tech vocational education and keep going back to school every ten years to get retreaded. We are not going to make it if we don't. It is as simple as that.

Now, unions in the States are dead. They mean nothing. The reason is very simple. In 1980, 22.3 per cent of our work force was unionized; it's 17 per cent now in the United States. It will be 14 per cent by the year 1990, and it will be less than 10 per cent by the year 2000. The Hispanic and black populations will both have more political clout than unions do. Unions knew this almost eighteen years ago when they started bringing in women and blacks for the first time. The only people who join unions now are people who work for the government, federal, state or local. And they have no clout and can't strike.

I'm talking about change. The point is, without being computer-literate, you are not going to make it. This is especially true in an information industry, and you are in that industry. Forty-four per cent of the population is going to be working in information, and half those people are going to be working at home. By the way, when you work at home, it is a different kind of operation. A small survey in Virginia of 250 families in which the husband and wife both worked at home found that the divorce rate quadrupled. It's called too much of a good thing.

When my grandfather grew up, he had to be able to take an engine and transmission apart to be able to drive a car, because nobody else could do it. To drive a car today, you don't have to be able to take apart the transmission or the engine. You just have to know where to put the air, the water, the gas and the oil.

It's the same with computers. You don't have to know FORTRAN or BASIC or COBOL or be able to program. You buy a floppy disk for \$35, you put it in the machine, and it does everything for you. But without that, you're not going to make it.

When do the kids start? At the Carnegie-Mellon University in Pittsburgh, I saw a bunch of two-and-a-half-year-olds typing away on computers. It was at the day care for the professors' and the graduate assistants' kids. I asked my guide, "How come they're on computers?" He said, "Well, they're too young to have co-ordination. They can't write yet."

Then I asked, "How do they type? What do they do?" He said, "You give them abbreviated names for passwords. For instance, you give Edward the name Ed, James is Jam and Jane is Jan. It says, 'Good morning, Jane, how are you today?' Two faces light up on the screen. The smiling face says 'fine' and the frowning face says 'bad'. The kid punches 'bad' and the machine says, 'Gee, Jane, sorry you're feeling bad. Why don't you type to me?'"

The kids are growing up with it. It's going to be like driving a car. You are going to have to be computer-literate, especially to get information out to your people, your public.

I talked about working at home. It is important to understand that when people start working at home, the whole house changes. When 22 per cent of our people work at home, the rooms will be different. In the United States the houses are changing now. There are no more formal living-rooms and dining-rooms. There is one combination-room. Just as we are changing the materials in cars and in computers, we are changing houses. We are making houses more compact; we are making them more energy efficient; we are putting computers in. We are now building houses in factories for the first time. GM will be the largest manufacturer of houses. GM will no longer be in the automobile business because by the year 2000 a car will last for 22. It's a rotten business to be in. There will be three manufacturers of cars — one in Korea, one in Yugoslavia, and one in either Brazil or Mexico, and that will be it.

The houses that are being built are different. The only rooms that are getting bigger are kitchens. We spend more time in the kitchen; with smaller families, the kitchen becomes an important room. And the other important room is the bathroom. In the United States, we don't mind living together, married or unmarried, but we have to have our own bathrooms. It's the only room we know what we're doing in. So we build more and bigger bathrooms.

In addition to the bedrooms, there will be separate rooms, and those separate rooms will be functionally designed. One side will be your entertainment wall, holding your stereo, your cable, your VCR. The other side will be your work wall. That's where you will have your interactive cable so you can work at home and communicate with your office. You'll be working at home a lot. That's where you will have all your disks, your videotape recorder and access to your library.

The kids will get their education at home every other day. They'll also be using cable. What happens if one malfunctions? The community centre, the place people will go, will be the library. That's where you will have access to your computers.

If one computer goes out, people will have to go to the library to get access, because they will only have their desk one out of every three days. Otherwise, someone else will be using the desk. You will have your own cabinet there, but that's all you will have at the office.

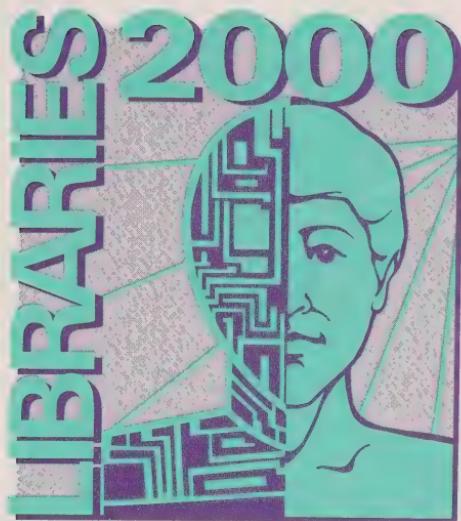
You can't give away information free. You are competing with Dialogue, with Lockheed systems, all the data bases. If information is given away free in a library, corporations will be upset. The corporations will determine what is available and what is not available in the future. The whole concept is changing.

To put it in very simple terms, the library industry is going to grow. It's going to become more powerful. The library is going to become a community centre. It will be where you go for retraining, for information. It will be the access place you use to get data instead of going back and forth to work. The community library will become more important; it will become a source of information for everybody. Libraries have tremendous potential. You are going to have to learn and be retreaded.

■ ■ ■ LISTER SINCLAIR ■ ■ ■

I think Marvin Cetron has rightfully called attention to the fact that there is likely to be a clash between the people who sell information and the people who provide information free. The American solution seems to be that the people who sell information will win. I think the Canadian solution might be that the people who provide information free will win.

ECONOMIC AND SOCIAL ISSUES PANEL



NEXT CANADIAN ECONOMY



KRISTIN SHANNON

*Kristin Shannon produces the **Canadian Trend Report** (Montreal) to forecast political and economic trends for corporations, financial institutions and government. Ms. Shannon conducts strategic-planning programs for clients across North America, Europe and in Japan. She is co-author of **The Next Canadian Economy**.*

At **Canadian Trend Report**, we have been busy over the last three months looking at a number of very closely related issues, and though we have very little time together here today, I would like to touch on some of these research findings.

Canadian Trend Report is Canada's largest economic and political forecasting business. We are, in effect, in the intelligence business. It is a particular pleasure for me to have an opportunity to speak with you, given your background, because at **Canadian Trend Report**, we depend on your library skills in our political, economic and social forecasting techniques.

Our principal methodology is content analysis. Content analysis is an intelligence community technique that was developed during the Second World War to forecast the evolving political will in a country without the co-operation of the population, much as our government leaders today try to figure out what people are up to in Canada. At any rate, our focus is on behaviour, in contradistinction to my colleague, Allan Gregg, who works with opinion measure.

We rely on Ph.D.s and library scientists to manage quite a number of the components of our business. So ours is an information-intensive business. From our perspective, the objective of information in the intelligence business is to decipher the development of a broad array of very effective responses. And that is where our role and yours overlap. In designing the learning institutions of the next decade, you have something very important to add to our increasingly complex and interrelated problems, nationally and internationally.

From my perspective, your job as information specialists is to widen our options in our culture, to help us make better choices. It is a task that confers power, and it is going to be a crucial task as we go through the transition to the new Canadian economy.

I'd like to turn briefly to the enormous structural changes that are taking place in the economy. Eighty years ago we went through a similar transition when we moved from the agricultural to the industrial world. At the turn of the century, 40 per cent of the Canadian population was employed in agriculture. Now this group is down to about four per cent. There was dislocation, a tremendous human cost, in that transition. Basically, we were shifting from one kind of muscle to another.

Now the long shift from the Industrial Age to the Information Age is accelerating rapidly. We are caught off guard and are not very well prepared. As John Kettle has noted, we were at the high point of the Industrial Age in Canada in 1953, in terms of the number of people who were employed in Industrial Age activities. Since then, we have been slowly changing the shape of our population, in terms of our employment.

At this time, we are also moving from muscle to mind; we are moving from manufacturing tangible things like steel and nails — things that you can count and develop productivity measures around — to producing intangible things, such as services, information, ideas and even feelings. I spent some time in California this summer, and let me tell you that the "feelings" business pays very well.

If money was the currency of the last economy, then information is the currency of the next one. That's all pretty abstract, and people talk very comfortably in an abstract way about the Information Age. I want to make it more concrete and talk about one industry in Canada, just to give you a feel for the rate of that transition. It is easy to picture if you look at just one industry.

I am going to take the steel industry, because that is a good, solid, masculine, tough, smokestack industry. We all know that if you are making steel, you are right in the middle of the industrial economy.

I recently chaired a meeting where, for the first time in Canada's history, the presidents of all the steel companies and all the heads of the union locals met with three Cabinet ministers for two days in Sault Ste. Marie. These people had never before been in the same room together, let alone sat down to do any joint problem solving. They sat down together because they realize that their whole sector is threatened. The changes had become so overpowering that even their treasured adversary system started to break down. They had to start dealing with what is going on in Taiwan, Nigeria and Washington. They had to begin to talk to one another, and it didn't come easily. It took four to five months to negotiate the agenda.

Canada has lost 8,000 jobs in the steel industry in three and a half years, but we are still producing the same amount of steel. Profits have gone up

and down, but it is clear that the pattern is going to continue. That is pretty much what it is going to look like for smokestack industries.

Now, let's be clear on what this means. If we shift from manufacturing to Information Age businesses, we shift from certain kinds of work to other kinds of work, and from certain kinds of pay levels to others. Steel workers in their prime earn about \$350 a week. When they get new jobs, they end up working for McDonald's in the food service industry, and they earn about \$220 a week. That is a 40 per cent drop in income for the people who are affected by these shifts. In single-industry towns, that is pretty serious stuff.

Steel is just an example of what this means in Canada. The middle class — and in Canada we all pride ourselves on being part of the middle class — feels uncomfortable about what is seen going on around it and what its real income potential might be during this transition to the next economy. This is not a wholly irrational feeling, as I have suggested by my example.

Another aspect of this transition is slow growth, jobless growth. Technology is not necessarily going to create the new jobs we had hoped it would. When Dian Cohen and I worked on our book, **The Next Canadian Economy**, we toured the country to interview winners and losers in the transition. In the book, we focus mostly on the winners.

Every corporate executive officer we talked to was using a new word: "down-sizing". They meant that they don't intend to grow in terms of employment in the foreseeable future. That is about ten years in terms of what they are thinking. They only intend to grow by acquisition. And, by the way, you don't say "lay off" any more in corporate Canada. You say "down-sizing".

This means that we can no longer automatically look to large institutions to generate a vast number of new full-time jobs. In the transition to the next economy, many new jobs will be part time, and many people will become small entrepreneurs. It's fast moving; it's adaptive; it involves a lot of creative thinking, good market analysis and quick reaction time. Quick reaction time is not necessarily something large institutions have specialized in over the last couple of decades. They are very slow to adapt.

Many Canadians wonder if we are really ready to go through this transition. They are a little uncomfortable. Our research shows that Canadian people think that their grandchildren are going to have a wonderful life, *if* they are here. You would be surprised how often we hear that little qualifier. If everybody's here in 2020, life is going to be fantastic, they say. We will have solar power and, of course, the petrochemical industry will be booming in Alberta; we will have bio-engineering and, therefore, no more disease and no more uncomfortable old age; we will have peace; we will have bio-engineered our way into a situation where we have a massive food supply, enough to go around for the whole world.

At any rate, Canadians are very clear about their picture of 2020 and extremely fuzzy about how we are going to get from here to there, how we will negotiate the trade-offs, and who wins and who loses in the transition to the next economy. So what do you do?

I would like to emphasize that the changes I am describing are not optimistic and not pessimistic: they are just what we face. What really matters is our response. And what particularly matters is whether our institutions are adaptable and will help us respond.

Number one, our attitudes have to shift. It is not a good idea to sit around and wait for the next cyclical change in the economy to bail us out. It is not going to happen. What we are going through is structural, long-term, profound, and it is not happening just in Canada. It isn't Mr. Mulroney's fault; it wouldn't even have been Mr. Trudeau's fault if he had still been us. It is going on in every industrialized country.

We can't control the change, but we can manage our response to the problems. The nature of these kinds of complex, global issues is such that no one, no matter how smart, can sit in any corner of the world or any one think tank or research institute and try to figure it all out. We have to talk to one another. This kind of activity is extremely important in achieving some agreement on how to respond to these challenges.

Secondly, our institutions have to become more responsive. In cultural history, societies and civilizations that made it through the knot-holes of dramatic transitions did so because their cultural institutions were pliable and responsive. Their religious and education systems adapted and helped them get through the transition.

That is where your experience with the educational system is valuable, because you are focusing on continuing education and learning, rather than on passive education, in keeping with your mandate. We don't even use the word "education" very much any more. We say "learning" at **Canadian Trend Report**. Our educational system is very rigid. It is not among the leading institutions in terms of adapting to future challenges.

Libraries, on the other hand, are far more flexible than schools. They can be very client-centred; some would even suggest user-friendly. They provide a neutral access to information; there is less business about imposing authority figures.

A number of high policy decisions are now being made in government to expand the role of libraries and of the people who direct those systems. We have been taking part in these discussions across the country. Of course, those in the political environment who are sensitive to these changes cannot go out and make a speech saying the educational system is too rigid, therefore, we have to find a way to support more fluid institutions that are more adaptive, responsive and appropriate to the kind of transition we are going through. Politicians lose votes saying things like that. But behind the scenes, some thinking is going on. That is why these kinds of activities are very important.

The most important tool to help us through the transition is enhanced learning skills, principally self-directed learning, where people can develop more adaptable schools.

At **Canadian Trend Report**, we focus not on what people are saying, but on what they are doing. We are finding that the experiments that people are making individually, trying to adapt to this information overload and the rough transition we are going through, are outpacing by a really large margin what the institutions are doing.

A few months ago, I was asked by one of our provincial government ministers to put together a team and to describe to him in straightforward, blunt language, just old-fashioned words, the survival skills of the eighties. The Minister was interested in knowing which of the institutions that the ministry dealt with fostered those skills.

We found it very valuable, and I thought I would share just a glimpse of the results, since so many of these survival skills apply to your field and your mission here in redesigning these institutions in the year 2000.

The first survival skill is, of course, trade languages. We have to talk; we have to do business with one another, particularly in the Pacific Rim area. I was educated in what could be Canada's fourth official language; that is, Japanese. I got my higher education in economics in Japan. Anybody want to guess the third official language? How about Chinese? Fifty per cent of the children in school in Vancouver right now speak English as a second language. Believe me, the first one is not French. Following closely behind these is Spanish. I am talking about Pacific Rim languages. Why? Because the growth rate, the expanding market, in the Pacific Rim will be four times what it will be in Europe. In Europe, the maximum will be two per cent growth, but in the Pacific Rim, it will be eight per cent growth. Our markets will have to expand in that direction.

The second survival skill is another knowledge area. This one may surprise you. It is biology. The process of synergy and the approach to problem solving employed by living systems will be most important in terms of someone's survival skills and income over the next fifteen years.

Back in the old days, when we had a very simplified model of the way living systems work and what Charles Darwin was talking about, our motto was competition. The more sophisticated current studies in this area now talk about collaboration, complementarity in terms of ecological survival, balance and the biological basis for life. Studies of living systems will be absolutely crucial in helping us through our institutional transition, so keep watching David Suzuki.

The third survival skill which I am going to touch on as briefly as possible is knowing how to use those funny thinking machines: computer literacy. Networking in particular will be essential, not just accessing data banks, which is again an extension of a passive activity, but forming networks of co-operative skills. There are many people now who are well versed in this, but it is an area that cannot be overlooked. People need to have good feelings about walking into libraries and being comfortable with the

hardware and software.

The fourth survival skill is a critical one and is rarely appreciated as a skill. In some cases it is treated as a nuisance. The skill is called multi-tracking. You have seen an eleven-year-old child watch MTV, do homework, talk on the phone, keep an eye on what is cooking in the microwave, zip and zap through some tapes using a headset and be able to tell you when the dog went out. That is multi-tracking. A whole generation is growing up with this crucial skill, yet our institutions are not fostering it. We are entering an area of severe information overload, and this multi-tracking, which enables people to decide what is worth chasing, shift their concentration and select priorities, is extremely important.

Let me give you a couple of quick examples of what people are doing to achieve these skills. At **Canadian Trend Report**, we work a great deal with people who have no time whatsoever. They are running corporations, countries, provincial governments and so on. They don't have any time and they are being sandbagged by tremendous amounts of information. They have to learn new languages, go on trips to deal with Pacific Rim trade, etc. They don't know how to juggle all of this. So they are busy learning these multi-tracking skills in very special seminars.

Let me just give you a couple of ideas, because I am sure many of you have some of these skills and have started studying them. What about sleep learning? Have any of you ever experimented with that? Or speed reading? What about left brain, right brain, being able to shift hemisphere and choose the appropriate learning mode? Let's call it being able to shift from analysing to synthesizing, from being linear to being musical or creative or intuitive, when it's useful for solving a particular problem. What about neural linguistic programming? Are any of you featuring books on that subject? These are very advanced communications skills. Look at books by Bandler and Grinder, for example. They are easy to obtain and will give you a whole new vocabulary for approaching some of these communications issues.

What about biofeedback — part of multi-tracking skills — amplifying something that is going on? What about peak performance? Are any of you into Yuppy sports like jogging?

Multi-tracking skills are involved in peak performance. Let me give you one practical example of that, of how people who have to know are outpacing institutions when they want to get into a rapid learning or peak performance mode. Let me tell you how the Dallas Cowboys do it. We know how tough and practical and sexist they are, right? So, they have to be real hardy marvels. The Dallas Cowboys use something every day called a flotation tank. That's their library. A flotation tank is a big, comfortable bathtub with a cover on it and filled with warm, salty water. You get in, you lie back, and you become very relaxed, very receptive, very dreamy. All sensory distractions are removed. A flotation tank is a new learning environment used originally in research. It was first used in weightlessness training for the astronauts.

A big, tough Dallas Cowboy climbs into this bathtub and drifts off into a semi-comatose state. Once he is in this state, his breathing slows down; his pulse rate slows down; he is calm and receptive. After about ten minutes of this and perhaps some soft music, a videotape comes on on a screen above his head. He opens his eyes and sees a football player doing something flawlessly — a pass, a kick or a play. In this receptive state, he learns faster if he sees only excellence. That is true in most accelerated learning programs. Material is internalized faster; neurological ability to repeat what is seen is enhanced by being in that kind of state.

The same principles apply to learning languages: deep relaxation, musical background. I am trying to suggest that there is a whole new world out there that requires different kinds of skills and drastic revision of our ideas about what a learning environment looks like, and in what environments people are most receptive to rapid learning and most able to choose what they need to learn.

Finally, the fifth survival skill is one which journalists and librarians know a great deal about. We have yet to figure out a good name for it. If any of you come up with one, please tell me. We simply call it "go find out". No single skill will better guarantee an improved pay cheque during the next fifteen years than the skill of going and finding out. This skill includes self-directed learning and the ability to formulate appropriate questions, as well as learning how to establish values and priorities. How to "go find out" is critical in terms of surviving and yet it is not taught. And you are the custodians of an institution where people would come willingly to learn those skills. How to "go find out", is really what they turn to you for. Here I must raise a design question. Is "go find out" easy to do in the current environment of library design?

In closing, I want to congratulate you all for being at the dead centre of the transition to the Information Age. We are relying on librarians and on the determination of the trustees and custodians of libraries to ask the right design questions, rather than just perpetuate the same system. We need to know how to go through these personal changes; we need to learn about multi-tracking, how to "go find out" and how to deal with the complexities of this world. Using my definition of the purpose of an intelligence-or an information-based profession, we need to learn how to develop more appropriate choices.

LISTER SINCLAIR

I think Kristin Shannon has laid out a long and fascinating string of skills and attitudes that we are going to have. I am fascinated to hear about eleven-year-olds multi-tracking, which they certainly do. They seem to me to be behaving like Julius Caesar sitting in his tent writing one letter, dictating another, reading a book and carrying on a conversation all at once, and conquering Gaul in the meantime.

I think there is a serious problem in all our minds; namely, the steelworkers who are now working at McDonald's. Why do they need libraries? To fill their spare time? What use will they be able to make of libraries? The impact of these things on labour is going to be very serious. I am going to ask Peter Cornell to start talking now, because he is going to address the effect of technological change on labour. Is it going to affect jobs for librarians, and will it mean that there are more people hanging around libraries? Those two answers are, I think, very different.

EFFECTS OF TECHNOLOGY ON LABOUR



DR. PETER M. CORNELL

*Dr. Peter M. Cornell is the Director of the Economic Council of Canada. Before joining the Economic Council in 1960, he was Research Officer for the Bank of Canada. Dr. Cornell has had numerous speaking engagements to governments, academic and business organizations. One of the many articles he has published is about fiscal policy, prepared for the **New Canadian Encyclopedia**.*

I think all of you already know the dilemma. The Information Revolution holds the promise of incredible increases in our capacity to produce goods and services, but every day we hear new and alarming forecasts of the jobs that are going to be lost at the same time. We can't back up, because one thing is sure: in today's global economy, we are going to lose jobs and real income to other countries if we do not keep up in the technological race. And, by the way, we have not been doing very well at that except in a few fields, one of them being, strangely enough, the automation of university libraries.

So, how do we harness these changes? I think two major questions have to be asked. The first one is: What will the overall net employment effects of technological change be? I think the second question is even more important and more difficult to deal with. What will technological change do to the distribution of jobs and income? Here you may find that I am going to be running up against Marvin Cetron, because I think we have grounds for some disagreement.

First of all, the optimists see the effects of technological change on our labour markets much as in the past, and historical evidence is on their side. Changes displace some workers; the same changes increase our real income, provide increased consumption and increased investment — and away we go on a new round of jobs, products and so on.

There is still a problem. It may only be transitional, but we have to transfer people who were originally displaced to new jobs, new industries, new locations. On the other hand, if our real incomes are higher from this greater productivity, we can better afford to do just that.

It is worth noting, too, that for many years, at least until the 1950s when real incomes were rising, the problem of displaced workers was solved

partly by shortening the average work week. It was also taken out in the shortening of the average work life. We went to earlier retirement.

Well, if that is the way the system has worked in the past, what is all the furor about now? What, if anything, is so different about the situation we are facing at this time? Can't we do something about it, perhaps with some additional emphasis on education and retraining? By the way, my answer there is going to be "no". I want that down right at the beginning, because that is where I think some of you are being misled. You can be educated, you can be retrained, but there may still be a great problem in the system.

The pessimists say no. They contend that there is something very different about the Information Revolution, and Kristin Shannon has already touched on some of that. There is an expansion of mental rather than physical capabilities. There is the possibility that changes will be introduced and diffused much more rapidly than previously. There is the possibility that the role of human beings as the most important factor of production will diminish.

Now, forget about some of the studies of specific industries, where 70,000 jobs are lost in this or 30,000 in that. Those industry studies do not pick up other compensating effects on the economy.

However, there are also more broadly based pessimistic views. Some people say, for example, that the high-technology industry will provide high-skill requirements and high-paying jobs for only a small proportion of the work force. What about the rest?

We know that there have already been declines, and Kristin Shannon mentioned these, in the demands for well-paid skills in our old smokestack industries. What about the service industries? During the 1960s and the 1970s, for example, the slack was taken up by employment expansion in services. A lot of people now suggest there may be limits to this process, partly because of the introduction of labour-saving devices in the service industries, and partly because of the resistance to expansion in government services. The Nobel-prize-winning economist Wassily Leontief, for example, suggests that in the absence of compensating effects, and I underline that phrase, the potential for labour displacement is such that enormously high output could be achieved with only a fraction of the present labour force. It might be a form of paradise coming about, but if income were still linked largely to the provision of labour services, it would be a paradise that contained ghettos.

Others, like Bob Kuttner, think that technological changes might or might not be associated with overall large-scale displacement of labour, but that the labour force would become polarized into good and bad jobs. A small number of jobs rapidly growing in the high-tech industries, and on the other hand, a very large group of people in low-paying, unsatisfying jobs. This is the erosion of the middle class.

Now, to the extent that people like Leontief or Kuttner are right, heavy emphasis on education and training would not be sufficient. There would simply not be enough good jobs to go around. Instead, the problem would be more one of finding ways to redistribute income to poorly paid or even redundant workers from the smaller group of highly paid workers, and even more so, from the returns to physical capital investment. Actually, we went through something like this in North America and in Europe during the nineteenth century, when a few people held a lot of the physical capital.

Let me touch first on these net employment effects. There are some factors affecting both the demand for and the supply of labour that are going to make this job displacement problem a little less intractable than the pessimists would have us believe. First of all, in Canada over the last decade, employment in high-tech industries increased more rapidly than in the economy as a whole. However, high-tech employment accounts for only about one-quarter of total employment in Canada.

On the other hand, during the 1970s — surely a time of major shocks — for every worker dislocated by structural change including technological advances, four workers found new jobs as a result of increases in aggregate demand, real income, consumption and investment. These are some of the compensating effects that were not considered by many people like Leontief.

What about the future? What about this idea of very rapid change, very rapid diffusion of technology? I would suggest instead that much of the new technology, for example that relating to the microprocessor, is likely to be more evolutionary than revolutionary in nature. There are a number of reasons for that, not the least of which is the budgetary process.

There is also the suggestion that our output of goods and services is likely to become so enormous that demand for them will simply be sated. I think that is ridiculous. Think only of the enormous latent demand in the developing countries for the goods and services of the industrial countries. Think of the erosion of public infrastructure in many western nations, including Canada. The mayors of this country have just come out begging the federal and provincial governments to help them repair the roads, bridges and sewers. We forget about those things. Think of the improvements we need in our health and education systems. They are full of gaps. So, in brief, I can't foresee any lack of demand for goods and services, although there could be some problems with changes in the composition for that demand.

As far as the supply of labour is concerned, again there are some compensating changes. First of all, our labour force is already growing much more slowly than it was in the 1970s. There are also possibilities for reduction in the average age of retirement and the average work week. I am not talking about sharing or dividing a given pie among more people. I am talking about sharing or trading off real income for leisure time or cultural activities.

Let me return to the more difficult question of how the gains from technological advance will be distributed. Will the lion's share be concentrated in a few hands? Will our labour force be polarized in the way that people like Kuttner have suggested?

Since Kuttner's article appeared in the July 1983 **Atlantic Monthly**, there has been a good deal of evidence produced in the United States to counter his thesis. On the other hand, we have done some preliminary work for Canada and have found that his thesis may work for Canada, but for the wrong reasons. During the 1970s, for example, the middle-class share (a band plus or minus 15 per cent of the average industrial income in this country) of both employment and income did, in fact, decline, while the high-and low-income groups increased their shares.

Again, there was a catch. Middle-class workers in the so-called high-tech industries expanded their shares of overall employment and income. So, with that happening, it is hard to say that high tech is responsible for this erosion of the middle class. Indeed, if Canada were to accelerate technological advance, the erosion might be reversed.

You have to remember, however, that to a considerable extent the changing industrial composition of employment has masked some very important shifts in the occupation structure within industries and in the skill requirements of particular jobs.

Occupational forecasting is a very hazardous business, and there are projections for both Canada and the United States which certainly could be challenged. But they do suggest that the jobs that will be in greatest demand over the next decade or so are by and large characterized by relatively low technological content, lower pay scales and only modest education requirements.

At the top of the list are secretarial and stenography jobs. Now, some of these jobs are going to include much more technology. But those are the occupations in Canada for which the increase in demand is expected to be greatest.

For whatever reason, then, there does appear to be a substantial shift in the occupational and income distribution of our labour force. That is why I suspect that although education and retraining will help, they are not going to be enough. We are going to have to put a great deal more emphasis in this country on improving our system for the redistribution of income.

Some of our problems are going to be taken care of by existing labour market mechanisms. But there will also have to be a number of changes in our institutions, including labour market institutions: more worker participation in decisions concerning production, more equity participation by workers, more emphasis on quality of working life, changes in collective bargaining. We have already reviewed collective bargaining agreements in this country, and we were amazed to find how few of our collective bargaining agreements contain clauses with respect

to technological advance. Very likely, there will be large-scale redefinition of jobs and job content.

In short, we have to go through a great deal of change in our thinking about the workplace and social organization. Our thinking lags far behind technological advance. We may even have to, as Leontief has suggested, get rid of some of our hang-ups about the work ethic.

Moreover, in sharp contrast to what appears to be the popular mood at the present time, I think that the coming period is likely to lead to an expansion in the roles of government, especially its income redistribution role. I don't rule out the possibility, or even the desirability, of privatizing some government services. But only governments will be able to carry out the large-scale redistribution that I think faces this country.

There are many gaps in our present health-care system, our education system and our information or library system. With the productivity improvements that we can expect from the Information Revolution, these gaps can be filled, and the quality of life of Canadians can increase to levels far beyond the present.

LISTER SINCLAIR

It's sobering to be told in a community like this that retraining may not necessarily be the answer at all. It is also a sobering reminder, picking up on what Kristin Shannon was saying, that the relation between technology and social change may by no means be linear, as in physics, but may result in feedback loops as in biology.

A famous study was done just over a hundred years ago on the amount of time that women spent in various kinds of housework. Of course, there have been enormous technological changes since, so a few years ago **Scientific American** picked up that study again and discovered that women were spending almost exactly the same number of hours on the same jobs, while using the various technologies available. People's expectations had changed. They expected to wash every day, to do the laundry and things of that kind every day, rather than once a month. The relation between the technology and hours of labour is by no means clear.

BENEFITS OF TECHNOLOGY



JOHN LEPPIK

John Leppik, president of Knowledge Systems in Toronto, is consultant to the information processing industry on business, product and application strategies. He has had 23 years of industry experience, including five years as director of research and development for IBM Canada.

I agreed with the Honourable Minister this morning when she said that you will be facing waves of change. If I were in your shoes, I would be concerned about these questions: how do I handle myself through this technological churn, how do I find my way through and how do I come out on top?

I think the Minister also gave you the answer. The answer is very simple. The way to come out on top is to look at the long-term needs of your customers, your clients, your users. I don't think they have changed very much over the years. In fact, I imagine the needs of the old Egyptian library in Alexandria were very similar to our needs today.

If we focus on the needs, we can start looking at technology as a means for serving those needs, rather than as something that takes on a life of its own. Also, when we focus on needs we are more likely to run into opportunity. As somebody said, "Tis not the gale, but the set of the sail that determines where we go."

Let me try to define a few terms as I go along. We all talk about change, information and technology, and we very seldom define what we mean by these words. To me, technology may mean an intricate machine or a microelectronic chip, but it is really much more than that. I think technology has much more to do with know-how, organization, resources, getting things done, and probably above all, having the will to get things done.

The bottom line really is accomplishing more with less. That is what technology is about, and high technology is about being at the very leading edge of accomplishing more with less.

Of what value is technology? Why do we want it? Why do we use it? The value of technology is in its potential for enhancing our quality of life. It seems to be limited only by our imagination and the value of our goals. When we talk about good technology and bad technology we are really talking about the value of our goals.

I'd like to talk a bit about your technology (and you are technologists too according to my definition). I think your fundamental technology is really the written word. It is as old as recorded history. I went into a library to check my facts and confirmed what I have believed for a long time. The written word and civilization really began at the same time. I think this is because the written word is mankind's permanent memory. Permanent memory made it possible for us to get enough information together in one time and place to get a kind of spontaneous combustion that resulted in what we call civilization.

Librarians have been managing information and using technologies to manage information for many centuries. I thought it would be interesting to see what kind of picture of the future I could paint for you. Where are we heading with current technologies? For that, I borrowed from Arthur C. Clarke's **Imperial Earth**.

"He walked to the console, and the screen became alive as his fingers brushed the on pad. Now it was a miracle beyond the dreams of any poet, a charmed magic casement opening on all seas, all lands. Through this window could flow everything that man had ever learned about his universe, and every work of art he had saved from the dominion of time. All the libraries and museums that had ever existed could be funnelled through this screen, and the millions like it scattered over the face of the earth. Even the least sensitive of men could be overwhelmed by the thought that one could operate a console for a thousand lifetimes and barely sample the knowledge stored within the memory banks that lay triplicated in their various separated caverns, more securely guarded than any gold."

Now, maybe that is the ultimate information dream, or maybe it is the information nightmare. In a sense, I suggest that it really is the latter, because we live in a world in which we are inundated with information. When I think of myself pushing that "on" button, I am afraid that I might be pulling the dump lever on a garbage truck while I'm standing behind it. We live in a world inundated with information, and yet we are thirsting for knowledge.

I have been in the information-processing business for twenty-five years and I have found very few usable definitions of information. The most useful one I have found basically says that information is data in context. Let me try to illustrate that. Data is a four-digit number, say 4357. It may be the height of something, the length of something or the amount field in your pay cheque. When it is a large context, then it is information. I like that definition because I can extrapolate it in both directions and get something new.

If that is what information is, then what is data? Data is noise in context. "Beepety-beep-beep" is just plain noise out of context. But given a frame of time and space, it can be the digits 4357, which is our piece of data.

That definition becomes more interesting when you take it in the other direction and ask what happens when you put information into a more specific context. I think what you can get is commonly called knowledge. What we mean by knowledge is the selected information that we need here and now to do what we are doing.

Information is a common, universal commodity which almost everybody can access and use. If you accept my definition of knowledge, then knowledge is a variable and very personal thing.

If you want to question my observation that information is almost valueless in our society, I suggest that you go to the Metro Toronto Library. If you haven't seen it before, it is an amazing building. It has six storeys, an atrium, balconies, draping plants, banners and immense amounts of information. When I first walked in there, I felt like Arthur Clarke at his console. I would have liked to consume it all. After thinking about it for a little while, I realized that there was no way I was ever going to be able to consume it in my lifetime, and even if I did, it probably wouldn't be of any more value than it was sitting there on the shelf. Now, that library is not used a great deal. When you discount the overflow of students from the University of Toronto and the people who come in to get out of the cold, there are relatively few people using this facility. If information is the currency of the future, then something is wrong.

The other day I saw a brochure that advertised a one-day seminar given by a lawyer on how to buy computer software: \$825 for a day for sitting in a room like the one you're sitting in, with perhaps another 300 people.

I have to ask you, "Why are you here today?" I don't think you are going to hear a single thing that isn't in your libraries already. I think the reason that you are here today, and the reason that a lot of people pay upwards of \$1,000 a day to sit in a classroom, is because you think you are getting knowledge rather than information.

I think that in addition to being custodians of an awful lot of information, you have the technology for reducing information to knowledge. That has tremendous economic potential: the difference between a mountain of free information and a \$1,000 seminar. I would like to relate that to something I heard last night. I heard that you all feel very proud of the fact that you have governmental agreements that library services will be free in the future. I would like to suggest that it is probably one of the worst decisions you could have made. That decision is going to keep you from getting into the knowledge world. It will keep you out of the information dissemination world. It will keep you from getting into that \$1,000-a-day kind of world that satisfies important needs.

You may wonder how you can get into this world of reducing information to knowledge. Let me suggest that it is not going to be done by computer people; it is going to be done by librarians. I am from the computer world.

The reason this is not going to be done by computer people was documented very nicely by the first programmer in the world, who happened to be a woman, Countess Lovelace, daughter of Lord Byron. She worked with Charles Babbage, who is credited with having invented the first computer. It was mechanical and he never got it up and running, but it is very clear from her writing that he did invent the concept. He called his computer the analytical engine. Let me just read a short paragraph here. Countess Lovelace wrote: "The analytical engine has no pretensions whatever of originating anything. It can do whatever we know how to order it to perform. It can follow analyses, but it has no power of anticipating any relations or truths. Its province is to assist us in making available what we are already acquainted with."

To put it into more current language, it says that conceptually computers can do anything, but in practical terms they can only do what we can instruct them to do in minute detail.

The history of computing has too often been written in terms of people trying to do with computers that which they did not know how to do without computers. I suggest that you are the people who have the technology for reducing information to knowledge, for making it relevant in the here and now. Although you have been displaced temporarily from the limelight of information technology by computers, I think that in the next fifteen years you will inevitably move back into front and centre if you concentrate on dispensing knowledge rather than just on storing information.

Again, I would like to repeat that the essence of technology is producing more for less: creating more wealth and finding better ways of distributing it. I think you have the potential to make your libraries into the productivity engines for our industry and society.

Let me just end with a warning about getting into the knowledge business. A schoolboy wrote an essay about Socrates. Very briefly, it said: "Socrates was the wisest man in Greece. He knew all there was to know. He told all he knew. They poisoned him."

LISTER SINCLAIR

I'm sure that at some time in the course of the proceedings we are going to find out why free information is so bad, especially if information is not, in fact, the currency of the future. What is the harm in handing it out free? Of course, you know, nothing is really free; somebody is paying for it somewhere.

I'm impressed, as I am sure you are, by this emphasis on technology as being related to us, and I think we should remember that not all technology involves microchips. My favourite piece of technology is the cowboy boot. Cowboy boots have four attributes, all essential. They are boots, not shoes, so the stirrup doesn't rub your ankle. They have pointed toes so that you can kick your foot back in the stirrup if you need to. They

have high heels so your foot doesn't slip through the stirrup. That is the biggest disaster that can happen if there is an accident. And — an innovation that was added comparatively recently — the heels slope so that when you are doing calf roping, you slide along the ground and do not proceed in a series of little jerks. Four points, all in cowboy boots. A very successful piece of technology.

THE SHIFTING GLOBAL ECONOMY

PROFESSOR ABRAHAM ROTSTEIN



*Professor Abraham Rotstein is a Professor of economics at the University of Toronto. He is a founding member of the committee for an Independent Canada and the Canadian Institute for Economic Policy. He was also a member of the Federal Task Force: Foreign Ownership and the structure of Canadian Industry (The Watkins Report) and the former managing editor of the **Canadian Forum**. He has edited many books including **Read Canada, Beyond Industrial Growth** and his latest is **Rebuilding From Within; Remedies for Canada's Ailing Economy**.*

I think it was courageous of the organizing committee to have not only one, but two economists. You know, you will get at least three opinions. I am surprised that anybody pays much attention to us anyway, because I think we have been increasingly more wrong than we have been right, and there are things going on with which our text books can't deal very well.

I must confess that it is a little embarrassing to be a teacher of economics at a university these days because the discipline is, in a way, so comfortable and so optimistic. In economics study, supply and demand connect to create prices; markets have no surplus goods or unsatisfied consumers; prices act as traffic directors and distribute the rare or scarce resources to precisely their best uses; and, at least in the old-style economics, there is no unemployment, everybody has a job and people adjust to technological change. All the parts fit: the capital markets, the goods markets and the machinery. Well, I don't know why one of my students doesn't come up to me and say to me, "Sir, if you believe that, you will believe anything."

The real world is moving in quite disparate directions. Consider the degree of industrial dislocation: we have somehow accepted the notion that double-digit unemployment, even according to the best estimates of the government, is going to be with us into the early 1990s and that we will have massive deficits for a long time. We have rapidly shifting aid structures. We have great waves of migration. We have the rise of crime and drug addiction. We have the break-up of families. We continue to have high real interest rates. How many of you remember when Gerald Bouey told us, at the height of the crisis a couple of years ago, that when inflation comes down, the interest rates will come down. Well, the

inflation is below four per cent; the real interest rates are as high as they've ever been.

Currencies are swirling in roller-coaster changes. Look at the course of the British pound over the last three years: it started at \$1.80 U.S., slid down all the way until it touched virtually one dollar and went back up to \$1.40. In other world currencies, the mark hit a twelve-year low as did the franc.

Things are going on which we simply cannot understand properly in terms of the standard textbook models. I suggest that the tools we have are quite old-fashioned. Economists can generally recommend two things: put on the brake or press the gas pedal. Rev up the economy or bring it down. And that response is, increasingly, too crude to deal with the problems we have.

I am reminded of a story told by my late mentor, Marshall McLuhan, who referred to an occasion when there was a great research oceanographic ship out on the ocean. It had sent a deep-sea diver down to check the bottom of the ocean. This was in pre-Titanic days. The deep-sea diver suddenly got a message from the ship, "Surface immediately. The ship is sinking."

That is what it feels like, to some extent, to be an economist in this day and age. I would like to tell you why this is so, based on some hunches I have had about what is going on. I want to put before you a dissident proposition. I am not part of the school that confronts this wave of new technology simply by giving you the clear message, "Get with it, man. And if you don't get with it, you're going to go down the chute."

I am going to raise the possibility that information is not necessarily a universal blessing, that it may have quite unexpected effects. Most of all, I want to suggest to you that one of the most precarious problems we face today is the state of the world financial system, and that this may be due, as much as anything, to the changes in the new technology and the accessibility of information.

Let me elaborate a little bit. What the Information Revolution, together with the computer and instant communications, has brought us is the world of EBFTS, namely, Electronic Banking and Funds Transfer System.

Bankers have access to machines with push buttons, and they are able to shift millions of dollars around the world within seconds. If the computers are programmed properly, a certain level of the Swiss franc or the Deutschmark will trigger shifts of hundreds of millions of dollars from one currency into another currency.

With instant information and instant electronic devices we have engendered a kind of volatile roller-coaster shift of tidal waves of currency around the globe. Something like \$80 billion in funds is footloose, washing around in the international banking system. There are currencies that belong to no one, such as the Eurodollar. They are triggers to instant mobility. I wonder, as I see the amplitude of the swings growing larger and larger, where and when we may get a crack-up in this

particular kind of system?

The textbook says that everything is going to adjust, that we are guaranteed a move to equilibrium and to stability. I find that the opposite is happening. The swings are getting more volatile. On top of the footloose currency, there is the unresolved problem of Third World debt. We have, over and above that, the problem of the high American dollar, which causes further distortions in the world economy. And we have a situation where — and this is probably the most difficult problem of all — the instant responsiveness of financial markets and currency flows is out of sync with responses in the other phases of our economic life. They move too quickly in relation to things like building a dam, changes in harvest or creating new plants and equipment. In the real economic world of capital goods and agricultural cycles, things move at a certain momentum.

But none of this approaches what the computer experts call real time, which is instant adjustment. Constantly, you get reverberations that are out of focus, and some which are far too fast.

The main point I want to leave you with is the possibility that instant information may not be an unmixed blessing.

Perhaps the simplest analogy I can give you about instant information is this scenario. Imagine a passenger group on an ocean liner at three o'clock in the morning. Most of the passengers are asleep. By chance, there is a fire in one of the lifeboats. The crew spots it and puts it out. When people get up in the morning, they haven't had the information. It's all been dealt with.

Imagine, however, the information scenario. It's three o'clock in the afternoon. People are strolling on the deck, having drinks or playing games. The word gets out that there is a fire in one of the lifeboats on the port side. Everybody rushes to the starboard side. There is a destabilizing effect of an enormous character. This is a crude analogy for some of the unexpected consequences that information may bring with it.

I really wanted to throw this cautionary note into this world of positive thinking. Before we get with it, know what we are getting with. I suggest to you that the globalizing of the economy carries with it precarious strains that we may not be able to handle because some of them are without precedent. They are testing our social institutions perhaps beyond their stress points, creating new difficulties which we have had no experience in managing.

I suggest to you that some of these difficulties have to do with our monetary system. I find, increasingly, that my hunch that there is something wrong in our monetary system has to do not only with the system's volatility but also with the fact that people are beginning to skate away from it.

The fastest growing area of world trade today is what is called counter trade. Something between eight and 30 per cent, depending on your estimates, of the goods that are traded in the world economy are not

traded with money. They are traded by barter. If you ask countries why, their answer is "shortage of hard currency".

On the domestic side, something very similar is going on. We are becoming alert to what is called the informal economy: under-the-table transactions using cash. Some of it has to do with interchange of goods between persons, some of it with crime and all sorts of other unsavoury things. The unregistered part of the economy is now a substantial proportion.

One portion of that suggests that people are increasingly interested in barter networks. Various businesses complain of a cash-flow problem. Whether you call it the hard currency problem in the international economy, or the cash-flow problem in the domestic economy, people are finding other channels and other ways out. I suggest that the globalizing of the economy, the instant information, the real-time effect of computer networks may create stresses and strains with which we may not be able to cope.

I don't altogether side with Dr. Cornell on this question of what will happen to employment. Don't forget that Marvin Cetron's robots have not yet arrived in Canada, and we are already at over 10 per cent unemployment. What do you expect is going to happen when robots come in full-scale? What are we going to do?

We are going to have to look for alternative institutions. We are going to have to find ways of getting around the blockages in the system. I suspect that we are going to invent, in practical ways, new facilities to cope. But I don't think we need to worship at the feet of anything that is new and technologically superior because somebody tells us it is bound to come.

I'm not advocating the other position. I think some of the changes in the new technology are inevitable. The crucial question is the rate of change and controlling that change. The crucial question is how to help the victims of change and how to shield the things that matter: our social institutions, our communities, the dignity of people whose lives are somehow connected with earning a livelihood.

Some of you may have caught the news flash today. Lee Iacocca, speaking of the United States, said, "We have fought the trade war with Japan and, believe me, we've lost." It's not something that is going to happen in the future. He says it is something that has already happened.

I won't speak about Canada and United States relations except in a general way. Ask yourself about the nature of the challenge of being hooked to what has been the world's greatest economy. It has now lost the trade war. This is the economy with which we are going to share the burdens of, as somebody called it earlier, "down-sizing".

Some of it is not going to be altogether pleasant. I agree that much will have to change in Canada if the country is to stay the same. But let's keep an eye on what is worth preserving. Let's keep some control of the rate at which things are going to change. Let's not be sold a bill of goods on

everything that is new and technological. And let's be alert to the fact that there are going to be many unpleasant surprises and that we may be placed in a very precarious economic network with this new information and computer technology.

LISTER SINCLAIR

Abe Rotstein, taking his customary humane view of the world, is urging us to take a humane view of technology and change. I think that is very good advice. The rate of change is certainly something that affects all of us.

I suppose all of us manage our business affairs very badly, write cheques hoping that they won't be processed too soon and do other things of that kind. The idea that things are going to happen instantaneously in the money world is horrifying. I think it is good to be reminded that the proper response to the slogan "Get with it" is to enquire exactly what "it" is going to be.

Adam Smith spoke of the invisible hand guiding and controlling the market. I gather that in modern economics, the invisible hand is giving us the invisible finger.

There is the question of how we, as Canadians, specifically see this. I refer to Dr. Rotstein as the eminent patriot he is.

HOW CANADIANS REGARD THE FUTURE



ALLAN GREGG

Allan Gregg, founder and president of Decima Research, conducts public affairs polling and marketing research. His clients include major political parties and multinational corporations.

The more I sit here, the clearer it becomes that one word comes up again and again and again. The word is "change". The more I get into this discipline, the more it seems, to me at least, that North Americans have a curious attitude towards change. There is no question that we are fascinated by it. You just have to look at the popularization of works by such individuals as Alvin Toffler, Robert Rice, John Naisbitt.

I suppose that whenever we talk about change, we are always associating it with the future, as if no change has ever happened in the past, and none is happening right now. Because of that linkage with the future, change takes on an ephemeral and almost surreal quality. It is something to think about, something to talk about, something to be afraid about, but never really something to do anything about.

The case I'd like to marshal today is that, attitudinally, Canadians have undergone profound changes in the last few years. The country is dramatically different today from what it was even five years ago. Many of our traditional assumptions about how to deal with the public or what the public really wants are currently moribund.

However, our regular quarterly tracking of public opinion tells us that there have been some constants within this change. Canadians over the last period of time have changed their definition of the problems facing the country and themselves and have seen some of these problems grow worse while others have diminished, but they have always viewed the problems facing the country and themselves as aberrations. They look to see the operation of the system, and they tend to be dissatisfied with the economy and with the general direction that the country is heading in.

Yet, they look at their own personal prospects and, while dissatisfied, tend to say, "Well, I'm a lot better off than the operation of the system." In



contradiction to that unhappiness with the operation of the system and neutral feelings about their own prospects, Canadians have constantly been bullish about the future. In effect, we are sensing a gap in public perceptions — a gap between the world as it is, what Canadians see outside their door, and the world as it should be, what they think is possible within this country.

On an individual level, they also see a gap, not as large but every bit as salient, between aspirations attained, that which they have, and aspirations sought, that which they seek and see as attainable.

A consequence of this gap or sense of abnormalcy has been an accompanying sense of unease on the part of the public and a parallel view that there is much more potential out there than we as a country or as individuals realize. That has been a constant condition over the last decade.

Secondly, although people may have altered — in some instances, dramatically altered — the way in which they have responded to these problems and even their beliefs of what might be appropriate individual and institutional responses to these problems, they have tenaciously clung to a traditional values system that has its roots more in the Second World War generation than in any notion of the 1960s or 1970s Pop Culture.

Notwithstanding a population that is increasingly concerned about its ability to find work, Canadians cling to the notion that if you work hard and put your mind to it, you can be anything you want.

Notwithstanding a trend to greater family separation and growing numbers of people saying you can have a happy and rewarding life without having children, the value that is placed on security and companionship related to the family endures.

Notwithstanding the growing trend to wanting flex-time in the workplace, more than one job during one's life and different, unstructured vacation patterns, we see a population that continues to place an intrinsic value on work and working.

Even though the population in recent years has become profoundly dissatisfied with how the system is operating, Canadians continue to believe that the system can at least partially solve the problems facing it.

What has increasingly happened over the last decade, however, is that those traditional beliefs have been assaulted by current events and assessments of how well traditional institutions have been able to deal with those problems.

It can be argued that this assault and contradiction have been going on since the mid-1970s, when inflation began to erode real incomes. But it was the recent recession in 1981 and 1982 that caused the most dramatic clash between traditional beliefs and experience. In fact, it would be no exaggeration to say that the recent recession of the 1980s traumatized the Canadian public.

We know through our regular research during the course of recessions that Canadians began to change their behaviour and their attitudes radically in that recession. In fact, we came out of the recession of 1983 a very different people. The population was significantly leaner, more self-reliant, more prepared to sacrifice. Canadians were more prepared to solve problems as individuals if they believed that their participation would lead to a public solution.

People were also meaner. They came out of the recession with a growing disdain for nonconformity and a growing willingness to accept authoritative and sometimes even authoritarian measures as long as the measures were expected to reduce the uncertainty in the environment around them.

We termed this outlook the post-survivor's mentality, because like all survivors, the Canadian people did not particularly enjoy this extended period of abnormality that had been heightened and exaggerated by the recession. But like all survivors, they believed they had learned some lessons by dint of surviving and changing their behaviour in order to survive. Like all survivors, they were saying, "Never again." In fact, the population was first and foremost associating the old rules and the old ways of doing things with the very problems they had encountered in the recession, and in turn was saying, "We are going to have to find new ways of doing things in the future."

As a result, the population altered its view of what was appropriate individual behaviour: Canadians' spending, saving and borrowing patterns changed dramatically. Canadians' sense of self changed. Coming out of the recession, they were not all down and out and disappointed. In fact, the Canadian population came out with a new sense of powerlessness in stark contrast to the low levels of personal efficacy in the past. People were saying, "I have coped. I've learned some new lessons. I am now armed for the future with the new lessons I have learned."

We also saw a changed notion of which government policies would solve our problems. As the population became increasingly concerned about unemployment, it began to reject public works jobs and financial bail outs of ailing industries as major job creators. Those had been the prescriptions offered by governments as Canadians concern about unemployment had increased.

We even saw a changed assessment in the population's desired role for business and government. Within the context of a society that had always demonstrated a pragmatic appreciation of government intervention and involvement in the economy, we saw the growing association of liabilities with government involvement, both in terms of our prospects for economic growth and also for our quality of life with that government intervention.

The population has increasingly said it is the private rather than the public sector that we must look to for solutions to our macro-economic problems. Canadians are still calling for government to facilitate and act

as a catalyst of initiatives, but they are now turning fully to the private sector for implementation of those initiatives. In effect, the population collectively concluded that the only way it was going to be able to achieve its traditional aspirations was to change the measure and means of its attainment. In short, to change the way we and society's major institutions did things.

It was called time for a change. But as a call for a time for a change, it was new and unique. In this period of time, we asked two really interesting questions. The first was, "Thinking back ten or fifteen years, do you think times were significantly better, somewhat better, about the same, somewhat worse, or significantly worse than they are today?" To which, virtually universally, the Canadian population said, "Those times were better."

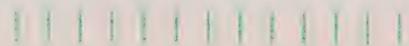
The next question was, "Think about what must be done to overcome these problems. Should we go back and use those ideas and approaches that have worked well in the past? Or are we going to have to use new ideas and approaches that have never been tried before?" In 1978, the population said we must try new ideas and approaches that have never been tried before. Canadians wished we could turn back the hands of time, but recognized that we couldn't, that we were in a new era.

They desired not charted courses where no one had ever gone before, but changes that were necessary in order to produce more stability, so that their traditional values could be realized. Change was a prerequisite of arriving at that stability. So, they concluded, we must change.

Throughout 1983 and 1984, all our indicators of the public mood were flat. The population received no evidence to contradict its notion that following the recession some things had got better. There was no new evidence to suggest that Canadians should really abandon the post-survivor behaviour and ways of thinking that they had developed during the recession. As a consequence, Canadians maintained their post-survivor mentality, notwithstanding their assessment that things had, in fact, got better.

Having concluded that the old rules weren't working, and having adopted a new set of attitudes and behaviour without any corresponding evidence that reaching those conclusions or adopting those behaviours would cause things to proceed, the population started questioning some of the experimentation that would be going on. As a consequence, the psychological commitment that we noted during the recession to restraint in spending, borrowing and savings patterns started changing to a pattern of discriminate spending. The person who was out there actively hunting for bargains, seeking out price differentials in the self-serve market, buying generic food, was the same person who was going out buying \$80 jeans that had someone's name on the bum.

In effect, we found a population that saw no value distinction in product categories, that actively looked at price as the only consideration in the purchase decision. In other areas, where there was a discernable value distinction, price was no object.



The notion that we have to rely on business started to move from encompassing all business to taking in only certain kinds of business. We started seeing a growing romanticism toward small business and an association on an individual basis with small business, not large business. The population had concluded that large business is perhaps not entrepreneurial and is, therefore, an unsuitable conduit for public policy. We saw that individualism, that sense of powerfulness, yielding to social bonding. Individuals increasingly said, "I can't solve these problems by myself, but maybe if I get together with like-minded individuals, we can solve them without relying on these traditional institutions that are no longer doing the job."

The election of a new federal government in the fall of 1984 triggered a burst of enthusiasm and optimism. But since that time, Canadians have sensed that the steady improvement in the economy and in the performance of our institutions has not been matched by any corresponding improvement in their personal situation. In fact, we have seen a growing sense of inequity, a changing view that there is more potential out there than is being realized, but that now the reason for this inequity might be that others are getting more than their fair share of that potential, at the individual's expense.

Even more importantly, we are seeing, for the first time, different groups in society responding to this collective sense in a diametrically opposite way. The old, the poor, the poorly educated, are starting to give up, retrenching further and looking to governments not to solve problems, but simply to protect them from the problems they already see around them. The young, the better educated, are changing their spending patterns, opening up their wallets, looking for government to get out of the way as they get as much as they can while they can.

We are seeing, in effect, the beginning of class-based thinking in this country, something that is completely foreign to the society that we've grown to know and, in many instances, value. Canada, once again, could be on the precipice of fundamental attitudinal and behavioural change.

What does that mean for the future? It would be tempting to look at the ageing trend, plus a population that values its current health care system and is loath to see any cutbacks in health care, and predict a monumental crisis in our hospital system by the turn of the century.

We could view the onslaught of new technology and see a population that is reluctantly prepared to believe that there are probably some macro-benefits in terms of economic growth, with advanced technology, but overwhelmingly also believes that the introduction of new technology will lead to depersonalization, greater need for manpower training and unsettling job dislocation. As a consequence, the population would fear technology on a personal basis. We could say that we will, in fact, have a new Luddite movement in the 21st century.

It is easy to look at the low fertility rates of working women today, coupled with the knowledge that the Big Generation has gone through



the school system and will within five years be out of post-secondary institutions, and say that our current educational systems and our library systems will collapse within the next fifteen years. Or we could point to the growing fissure in the thinking among those at opposite ends of the socio-economic spectrum, or to changing patterns of racial immigration to this country, and predict widespread class and social conflict into the future.

We could do all that, but it would be not only irresponsible, but probably incorrect. If we know anything from our analysis of public opinion, it is that new attitude formation and behaviour almost always result from an intricate interplay between what society views as a valued end result and its assessment of the best way of achieving that goal. Our experience also tells us that if the final result is seen as increasingly unattainable in a relatively mature and stable society, the population does not change its value system at all; it merely changes its notion of what is the most effective new way of keeping that end result intact.

In fact, probably the most pioneering study of values systems over time, conducted in Poland, demonstrated exactly that. The researchers noted no change in value systems whatsoever in a society that has witnessed massive social upheaval. The only thing that changed was the population's assessment of how well Poland's major institutions were responding and assisting in the attainment of those aspirations and values, or how they were standing in the way of the attainment of those same values.

So, we can look at ageing and say that rather than facing a crisis in the health care system, we may have a new type of old person in the future. When you think about this, it has already happened. The 1960s and 1970s emphasis on youth has been firmly translated into a 1980s emphasis on middle age. The generation that said "Never trust anyone over 30" is still in the news, and it has upped the ante to "Never trust anyone over 40" and is looking very seriously at "Never trust anyone over 50".

People magazine asked its readers, "Who is the most beautiful woman in the world?" Of the women who came in first and second in the last two years, two were 53 and 44 years of age. We have redefined beautiful; we have redefined old; we have redefined young. We recently undertook a study of senior citizens and their families for a developer. We asked the families, "What do you think grandma and grandpa want in senior citizens' facilities?" They said libraries, parks, reading rooms, medical facilities. Then we asked grandma and grandpa, and they said they wanted a beauty parlour, a gym and a disco.

We can look at technology and see computer fear, then look underneath and note that the younger generation doesn't share that fear. In fact, those who work with new technology do not associate it with personal liabilities. They are much more prone to expect social benefits from the introduction of new technology, and to conclude that, far from computers leading to a new Luddite movement, this problem will

probably go away in the next ten years. But they believe that we will probably have a traumatic transition in the next ten years. Those who are genuinely interested in the advance of technology into the workplace and into the schools are interested in selling hardware and software, and not in education and learning.

We will be fostering a new generation of illiterates and causing more social trauma rather than less.

We could look at those fertility rates and at attitudes towards the educational system that increasingly say there isn't the relevance in the educational system that there once was. Instead of predicting the education system's demise, look also at the population above school age, increasingly saying that it needs to upgrade skills. Rather than the educational system and libraries collapsing, these institutions will become decentralized and move out of traditional buildings and directly into the work place.

The prospects of class and social conflict are real. But if there is a growing sense of unfairness building up in Canadian society at present, it is because Canadians see institutions that they have traditionally relied on for protection or assistance in fulfilling their aspirations contributing to this lack of fairness from which they have no institutional recourse.

The bottom line is that you cannot extrapolate public behaviour and public opinion in any straight-line fashion, because you cannot predict behaviour in the absence of events and actions that will engender those behaviours and attitudes.

The future is ours to choose and to shape. The actions and decisions of business, government, labour, the media and society's leaders will shape that future.

The challenge, therefore, is not to predict the future but to understand, monitor and respond to change that has occurred and that will occur in the future at a never-ending pace. To that extent, I agree wholeheartedly with John Leppik. That challenge does not mean the gathering of more information, but the synthesis of information from multi-disciplinary sources into knowledge. Your discipline is central to that challenge. If we are to choose a future that is acceptable rather than unacceptable, I can only hope that you, and many more like you, are up to that challenge.

LISTER SINCLAIR

Bertrand Russell was interviewed on his eighty-fifth birthday and asked, "You know, you've been a firey radical all your life. What has changed you over the years?" And Russell, on reaching the age of 85, said that his hopes for himself and for humanity had not changed in the slightest. His expectations, however, had changed a little. Of course, that is what I think we are talking about. We are talking about changing expectations and unchanging hopes.

I will tell you something about bird watching, which is a hobby of mine and has, I think, some application to what we are talking about. If you are lucky in bird watching, you may wind up in a herony, which is a place where herons nest. They nest in trees, rather surprisingly. The time to go is when you have hay fever or a severe cold, because the ground underneath has been heavily fertilized, to put it politely. It also contains two or three dead bodies of young baby herons. When you examine one, you will discover (all this is true, by the way) that the back of the skull is missing. What happens is this. The mum goes out and fishes with that famous motion, partly digests the fish, comes back, sits on the edge of the nest and waits for little Fred to give the signal, which he does by tapping her beak, and then opening his beak, then keeping still. She then feeds him by delivering the fish like that, in that same gesture. If he moves, and it very occasionally happens, he winds up with the back of his skull missing. But for the benefit of the species as a whole, obviously that system works.

I'm always worried when I see people with bright, shining eyes around me. I wonder sometimes if the backs of their skulls are missing, and the light is coming through, especially since it seems to me that these people are the product of the educational system. Teachers are hard at work trying to deliver the goods, and if you move, then whoop — out goes the back of your skull. Should you be delivering education in the form of high-velocity packets of pre-digested fish or should you be teaching people how to make fishing rods?

PANEL DISCUSSION

LISTER SINCLAIR

Now, I'll come to some questions. Here's one.

I'm not interested in technology, but I do think of myself as a creative, forward-looking person. I do want to be innovative on the job. I like people too. Is there any future for me?

JOHN LEPPIK

I think that you have a future, and I think that anybody who is interested in people rather than technology has to have a future. No technology has ever left mankind behind, and none ever will. For it to do so would be to commit suicide. So hang in there.

LISTER SINCLAIR

The late Jacob Bronowski was a friend of mine. One of his daughters, in her turbulent adolescent stage, was denouncing her father for being so interested in technology and its social influences. She said to him, with a straight face and with much indignation, "I have no need of technology, nor does my generation. We are self-contained. All we need is our transistor radios and the pill, and we are okay." And she meant it.

I am going to read a number of questions one after the other, because they all revolve around the topic which seems to be exercising you at the moment.

Could you explain why libraries are making a mistake in not charging for services and materials now or in the future?

Here's another one:

I am troubled by the "charge or perish" attitude. Why have these people not taken the trouble to find out what a public library is? Briefly, a public library was and continues to be the social institution that allows the citizens of a democracy to read, learn, see, hear, discover, uncover the information they require to be fully active, participating citizens. In this context, I ask if knowledge-information is power, or at best access to power? How can anyone suggest we deny it to any citizen who simply cannot afford it?

A very parliamentary question, isn't it? You know, the speech imbedded in it and the question at the end. Same question, you notice:

Mr. Leppik, you have equated knowledge with business and the \$1,000-a-day seminar. I am horrified at that suggestion. Libraries have fought out the battle for free services in the nineteenth century. Do we



have to defend that again? If librarians charge for information and knowledge, how will they meet the needs of the low-paid service worker who may have been displaced? What does the panel see as the needs of these low-paid service workers for library services?

And here's an even briefer one:

Question to John Leppik or anyone else who chooses to impart knowledge: What happens to people who can't pay?

PROFESSOR ABRAHAM ROTSTEIN

If I may just add something, one of my favourite people is the late Frank Scott, who was the eminent civil libertarian and professor of law at McGill University. I recall a letter he wrote to the Montreal **Gazette** a couple of decades ago when the issue came up about many of the cultural services of the community, including libraries and museums, running deficits. And he said, "How is it possible that all the worthwhile institutions are running in the red? Has the world been constructed in such a peculiar way?" He concluded, "Is it possible that God was not an accountant?"

I think that speaks for itself.

LISTER SINCLAIR

I would like to raise a question too. I presume nobody really believes that library services are free. I suppose the question is: "Should they be paid for as a fee for service by the users, as the medical profession loves to put it?" Isn't that the issue, not that they cost money, but whether that cost should be sustained by the user or by the community? Could I rephrase it that way?

JOHN LEPPIK

Well, let me share a personal experience. I use Info Globe for my business, and it is very useful to me. It costs \$50 a search, or thereabouts. I have found that I can go to the Metro Toronto Library and halve my costs. If I go to the Scarborough Public Library, I can probably reduce my costs even further.

That is very nice, and I appreciate that, but I don't think that we, as a community, can afford to do that on a very broad basis. I don't think there really is any need to do that.

You can now buy a catalogue listing thousands of computer data bases, almost all commercially operated. You, as a community, operate very few, because you don't have the funding to do that. Do you really want to lock yourself out?

KRISTIN SHANNON

I like these questions. Maybe we will get some links to what we are supposed to be here to talk about, which is the future of your institutions. Info Globe has 3,000 users. There are 24 million Canadians. When I suggest that information is the currency of the new age, I use currency to mean "medium of exchange", what you have to trade. You can define the word "information" into oblivion, or you can expand your definition to say that information is asking the salient questions, and call it knowledge. It doesn't matter.

What is important is that three of us today, Peter Cornell, Allan Gregg and I, tabled some very interesting data coming from completely different directions, saying that the Canadian public is very uncomfortable about this transition, and that issues common to a class-based society are beginning to surface. We're using words that we weren't using two years ago. We are saying "we" versus "them". In the transition to the Information Age, to the next economy that we are hip deep in right now, access to information, to knowledge, is power.

I think that the questions coming from you are central to those concerns that Peter, Allan and I have been emphasizing in our research work. People are worried about being left out. There is a profound political as well as, in Frank Scott's terms, moral constituency to try to ensure that these key points of leverage in the transition to the next economy are available to people very broadly, not just to 3,000 users of Info Globe.

PETER CORNELL

Following up on what Kristin Shannon and Allan Gregg said, this problem about income distribution is really becoming very disturbing to us. As Kristin has said, it gets us into something almost like class warfare. Let me turn this question to John Leppik. In this country we have, by and large, medicare, that is, public health care. In the United States, a lot of health care is private. John says we can't afford to have our public information system, our public library system, free. I would probably agree that there are certain parts that we could charge for, that could be privatized.

Although the cost of medicare has gone up, it is still something like eight per cent of our Gross National Product. In the United States, it is considerably greater than that, and there are a lot of Americans who wish they could go to something like our system. Our terrible system, which is being criticized right, left and centre, has a better delivery system than the American one. True, we may not have made some of the major advances but, overall, we have a better health delivery system than they do, and at a lower cost. We still have a long way to go.

I would argue that a lot of the public information system is going to have to be just that. It's going to have to be public, and we can afford it.

JOHN LEPIK

I like the medical system too, even though it does have some problems. I think the free library system is something we will be staying with too.

What I have been trying to point out is that there is an additional opportunity. If we do indeed equate information or knowledge with power, then I suggest that I don't know of any instance where mankind has ever distributed power for free. In fact, I think that is a contradiction in terms. I don't think we are about to do it in our information economy.

LISTER SINCLAIR

I think that is certainly a stern and trenchant question. It has always amazed me that, on the question of free libraries and distributing power for free, mankind never learned from the experience of allowing the British Museum Reading Library to be open for free to Karl Marx.

If access to knowledge is power, why are librarians not more powerful? How do we trade access to knowledge for more public support?

That's a good one, I think. I'd like to get to another question.

Should we expect a change in the criteria by which prestige is judged in the future? Political, social, national prestige are acquired with what? With dollars? Information? Intelligence? Vocation? How, in fact, do we keep score in our society?

How do you think Canadians feel they keep score, Mr. Gregg?

ALLAN GREGG

In terms of trading access to knowledge or to information, depending on how you define it, I think everyone agrees that there is going to be an increased premium on that desire for public support and getting the score card is a function of social relevancy. I could not morally support user fees for libraries, but I have to wonder when I look around at beautiful, brand-new libraries, fully open and free, with no kids in them. And I go down to the video station and see the kids pumping quarter after quarter into machines to learn hand-to-eye co-ordination. Something is wrong.

I don't think anything is wrong with the kids. I think it has to do with updating skills and re-establishing the relevancy of what is, unquestionably, an increasingly relevant area.

Going back to the remarks I made earlier, I think that the institution is not seen as relevant. If an institution is not seen as meeting the wants and needs of the population, it quickly becomes moribund and the population turns off.

Kristin Shannon talked about something called multi-tracking. Others have called it medium maximization, information overload. Boy, you are in a really competitive marketplace in terms of information. If you are in a competitive marketplace, you have to compete whether you like it or not. I guess it is that hard and that simple at one and the same time.

LISTER SINCLAIR

It's a very interesting thought that the free library system should be prepared to compete with the video arcades. I'm dead serious about that. I think that is a serious and important suggestion.

I'd like to go back to something we said earlier this morning; namely, that you are in the information business, not in the book business. At least, I don't think you are in the book business. You're in the information business in the widest sense. I feel strongly that we perceive the world by means of art, science, religion and magic. I include things like falling in love and patriotism as branches of magic.

I think that libraries should be addressing all those different ways of perceiving the world, because all of them have imbedded within them revelations, pieces of enlightenment, pieces of experience and, above all, vast quantities of information. The arts are information just as much as a table of how many wdigits are being produced in Zambia.

KRISTIN SHANNON

For those of you interested in super learning, there is a paperback available, called **Superlearning**, by Sheila Ostrander and Lynn Schroeder. I suggest that book in particular because it is a good access guide to additional learning systems.

With respect to neurolinguistic programming, read Bandler and Grinder. Lister, you will be happy to know the title of their book is **The Structure of Magic**. It has to deal with the interaction and communication processes.

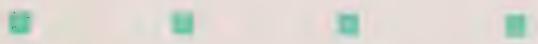
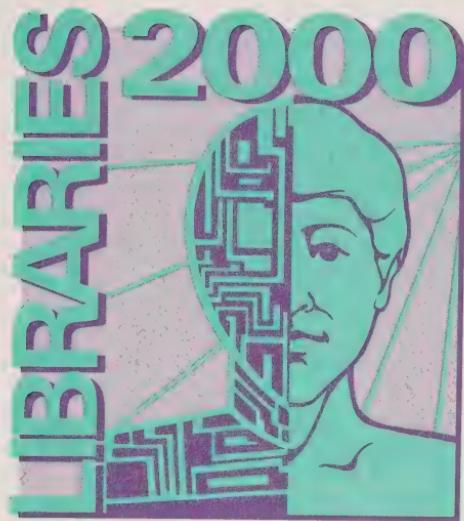
Those are now anomalies. What the kids are learning down at the video arcade isn't just hand-to-eye co-ordination. They're learning pattern recognition techniques too. That's what people have found when they take a look at who wins those games. It's not just those who have the quickest hand-eye co-ordination skills, it's those who subliminally come to anticipate the pattern buried in the computer programming.

What I was trying to raise with you this morning is very simple. It is that libraries are custodians of the learning process as well as the products of that process. To that end, I hope you do talk about the design questions in your more interactive seminars. I have one about the overall structure of this program, which is the answer to why the kids are down at the video arcade instead of at the library. Somehow the design of that environment and the articulation of your mission isn't communicating social relevancy.



One more thing libraries may not be communicating, which is absolutely critical — **fun**.

NEW DIRECTIONS IN TECHNOLOGY PANEL



NEW DIRECTIONS IN TECHNOLOGY PANEL

DEVELOPMENTS IN ROBOTICS



IAN BARRIE

Ian Barrie, is Vice President and General Manager at the Ontario Robotics Centre. Mr. Barrie has a degree in Mechanical Engineering, an M.B.A., and has had an extensive career with the General Motors Oshawa assembly and fabrication plants. The Ontario Robotics Centre offers professional advise and technical guidance to Ontario Companies seeking to automate their design and manufacturing processes.

My experience has been totally in industry, but I believe there is a direct link between what is happening in industry today and what is starting to happen in libraries and will continue in the future.

Forecasting or predicting the library of the year 2000 is dangerous. Anyone can straight-line predict the future, but significant events can occur that change the course of history. I would not want to have been the person who in 1880 predicted that, with the growth of the urban areas and the increased requirements for individual forms of transportation, there would be so much horse manure on the streets by 1920 that nobody could move. The automobile, that significant event, not only made the streets passable, but made the horse obsolete as a means of transportation by 1920.

My comments today will deal with both the mechanical and the management side of the library. What I mean by the mechanical side of the library is the transportation, the storage and the retrieval of textbooks.

Ontario libraries have approximately 24 million volumes of texts on their shelves today. These texts are moved approximately 65 million times a year. With all these texts and all this movement, you are in the materials handling business whether you know it or not. One of my assumptions is that the texts will be with us in libraries of the future. Some significant event may change that, but I still can't visualize cozying up in bed and reading a novel from a terminal.

Manufacturing engineering technology, and that includes robots and other technology, is being developed at a greater rate than it is being

implemented. In other words, new items are coming on the market and the gap between the abilities of the technology and the actual technology that is being used is growing. So there is no lack of opportunities for improvement.

It would take approximately ten years to implement all the technology that is on the shelves today into industry. There is a definite lag between what is being invented and brought out in the commercial market, and what is being installed. I'm talking about equipment that you can buy, that is economically feasible for installation in your plant. I'm not talking about research and development, and the gap is there too.

As you heard this morning, the cost of this technology is decreasing very rapidly. I may not agree exactly with the numbers that were used this morning, but the cost of the technology has decreased in the range of 30 to 50 per cent over the last five years.

There are many other areas of development in industry. In the area of sensing alone, right now two-dimensional vision systems are available and being used in the factories. They are used for inspecting two-dimensional planes. In 1980, you could not buy a commercial vision system to use in manufacturing. Today, there are about 250 companies selling vision systems with a market of about \$100 million a year.

The problem with the two dimensional is that we live in a three-dimensional world. Three-dimensional vision is coming; it is in the development rooms now. In two to three years, we'll be seeing it.

Other senses are being developed, such as the sense of touch. In other words, by using a robot or some other mechanical means, you can get some information from an object by just touching it: information on its shape, its weight and other things.

Speech recognition. As was said this morning, there is a limited, six-thousand-word vocabulary speech recognition system available. That is very limited and doesn't really have any practical purposes in industry today. But the breakthrough has come. With time that vocabulary will increase. What will speech recognition do? It will eliminate the keyboards, and the keyboards are one of the most intimidating items of the computer right now. They are intimidating to the plant worker because he is not used to typing. They are intimidating to executives because executives don't have to type; they have secretaries to do that.

Artificial intelligence is another area we hear a lot about. The R2D2-type robot is still thirty, forty, fifty years away, in my estimation. But the artificial expert system, systems that have a set of rules that are based on people's experience, are available. The computer will go through those sets of rules and, using the information it has from the environment at that time, will pick out the best possible solution, depending on those rules. Those systems are available today, in small numbers, but they will increase.

We all hear about the factory of the future — no people working in the factory, lights out, cold. They're still a long way away. Just to give you

some idea of the difficulties, the National Bureau of Standards in Washington is trying to develop a factory of the future with five work stations, and most things in manufacturing take a hundred times more than five work stations. They have a staff of approximately a hundred and fifty people spending \$80 million over seven years, and they hope to have the factory of the future, a dollhouse-size factory of the future, ready in 1987. A lot of work and development is required there.

All these areas I've talked about, and all these technologies that are being developed in manufacturing today, are a direct result of the computer. Any more major breakthroughs or significant events on the computer will just increase the utilization and development of this technology. If you look at technology's abilities, they always relate to the abilities of the computer.

Now, back to my point about libraries and the materials handling business. Materials handling is one of the largest portions of work done overall in industry. Materials handling is involved in bringing in the raw stock, in moving it from process to process and in shipping it to the buyer.

Materials handling is a major problem in industry, and at present it is the most costly because it is heavily labour intensive. Equipment is available today in industry to ease the materials handling and it has been adapted by the libraries. One that I am familiar with is the bar coding. Bar coding was originally used for identifying parts in manufacturing. It has developed into products for consumers, and it's now used in libraries. A tremendous amount of other equipment is available, and economically available, in materials handling and could be used in the library.

If you stretch this to one extreme, you could automatically store and retrieve inventory, all the texts, without anybody touching it. Recently, the Liquor Control Board in Whitby, Ontario, put in a new warehouse. That warehouse unloads the trucks; depalletizes, or takes the cartons of liquor off the pallets; stores them automatically and remembers where they are stored. If somebody orders a shipment, then the shipment is put into the computer, whatever is in that shipment is brought down automatically, repalletized and put into the truck. That's not all working fully yet, but that's the end result. It doesn't take much imagination to take that technology and use it in a library to move books.

We have all this technology. But there is a gap between what the technology really can do and how people are using it. It's a major problem in North American industry today; it's a major problem in world industry today. Some countries have a smaller gap than other countries. The main reason for that gap is management. Management is not convinced that technology is a good thing.

The large automotive and electronic companies are betting their corporate survival on technology. General Motors has been spending billions of dollars over the last five or six years modernizing its plants. It is spending an additional billion dollars coming out with new products. Ford and Chrysler are doing the same. Northern Telecom, IBM and Xerox in

the electronics industry are committed to using technology to make their manufacturing facilities competitive on a world level.

Why are they spending all these dollars and doing all this if it's not a good thing to do in manufacturing? The main reason is that those industries have been hit very squarely between the eyes with foreign competition. They know they have lost market share; they have lost jobs; they have lost power. They have suffered through the competitive pressures of the foreign market.

They have been successful too. Take the North American products. Maybe not everybody is convinced yet, but their quality certainly has improved over the last five years. The prices have remained stable even though labour costs have gone up. The Chrysler van plant in Windsor, Ontario, is one of the most modern plants in the world, and the success of that particular product, that van, is partly because it is a good product.

Three or four years ago, Northern Telecom did an analysis on the phone that it was building at that time. The company could buy a telephone from the Pacific Rim countries for less than the cost of the materials in the phone that it was making in London, Ontario. Even if all the labour was taken out, it still could not produce a phone more cheaply than importing. But Northern Telecom made a really gutsy management decision.

Northern Telecom decided to stay in the manufacturing of telephones and to use the latest automation. Now they're building the Harmony phone. It's so light they had to put lead weights in it so it wouldn't slide across the table. At the same time, Northern Telecom is producing a telephone three to four dollars more cheaply than it can be bought from the Pacific Rim. So, if we put our minds to it in industry, we can do it.

The companies that have done this are in a minority. They have done so because they've been hit by the competition pressure. A great majority of industry management has not been forced into the corner by the competition, and most managers are staying on the **status quo** path. Their time will come, and I hope it's not too late to save them. This is one area where I think the management and the employees of libraries can learn from industry. Don't wait until you are forced into the technology. Start looking at it now: it's there; it's available; it will do things for you.

Your competition, as was pointed out this morning, is really all the other leisure activities. I see your market in two places: leisure and reading, and information. In both areas, you have very strong competition. If you don't meet that competition, then you will suffer.

You really don't have foreign competition that I know of, but the day will come with electronics that you may have foreign competition.

The reason for using technology is to reduce your operating costs. Operating costs, I'm assuming, are the same in the library as in industry. They're made up of labour, inventory costs, costs of financing and several other expenses. Technology will help you reduce those costs.

Lower operating costs will generate funds within your organization. Use these funds to purchase more texts, improve your facilities and perhaps

put a video game centre in the front of your library.

You have limited resources; you have limited funding. Technology will improve the use of that funding.

In summary, I would predict that the new technology equipment will not be the limiting factor in the libraries of tomorrow. There will be loads of equipment to help you. The limiting factor will be the management and its ideas and actions on implementing the technology. It is up to you to create that significant event that will not allow my prediction to be true.

LISTER SINCLAIR

It is a salutary piece of advice to remind us to try to get one step ahead of the game, and not allow technology to dictate the path by a series of random moves so that we are trying all the time to make short-range decisions without looking for a long-range purpose. I know that in broadcasting a fascinating piece of technology will often lead everybody gaily away into a blind alley, and it sometimes takes quite a while to get back on track again.

HOME ACCESS TO INFORMATION AND CULTURAL ACTIVITIES



ROBERT RUSSELL

Robert Russell as president of Orba, Inc., is a lecturer and policy advisor focusing on information technology. As a policy advisor, he has worked with both private industry and government clients, most recently completing a major technological forecast for Labour Canada's Task Force on Microelectronics and Employment, a study on complete software for the Quebec Department of Communications and a paper on information economics for the Deputy Minister of Industry (Ontario).

*He currently authors the column, "The Information Economy" for **Executive** magazine and is author of two books on office automation.*

I'm something of an expert on working from the home, because I've been doing it for a while. My wife is a photographer, and she's working from our home as well. So, we've been four years locked on the thirty-fifth floor of the Manulife Centre. It's working out quite well, I'm happy to report.

Part of what I have to say about working in the home is based on personal experience, and part of it is based on my professional experience, which has largely been forecasting in this high-tech communications area. I simply apply what I understand is taking place in the technology to how it would affect the home as it relates to the library system.

I'm going to talk about it in three categories: working from the home, development in the home (that is, personal development, the kinds of general purposes the library had in the older civilization) and entertainment in the home. Although these categories keep changing and blurring, this is certainly one of the growth areas ahead of us.

Working from the home. One of the jobs I have at this moment is putting an advisory group together for a Toronto company called Inex. Inex is a research laboratory, something like Bell Labs or Bell-Northern Research. It has three floors of scientists, IBM computers, design stations and graphic terminals. They're putting together something for the market that will be ready about two years down the line — an electronic librarian. This Inex system is a front-end computer that you could dial into and, through it, get into the various on-line data bases that are proliferating and with which you are largely familiar. If you put the artificial intelligence into this front-end computer, it will translate your questions into the precise protocols for each of the data bases that you want to access; it will be



able to advise you as to what data bases you want to get into for the particular question that you have; and then it will help to translate your question into the technical terms that the data base requires so that you can get the maximum use from it.

It should also, if the designers are able to do this, build in some kind of quality controls so that instead of giving you more replies than you need, the computer will try to find the quality items in what you want and offer you a better-quality service than you could get if, for instance, you were just approaching these data bases on your own.

Their schedule is to have this on the market within two years. It's too early to say whether they'll make it or not. But work is being done on an electronic librarian.

The other day, someone was over to my apartment office and was telling me what was going on in California. Gary Kildall is the designer of a CPU, which is the operating system for a whole middle range of personal computers. The operating system is a level of intelligence that lets the computer carry out the programs that you have put into its floppy disk. In other words, it's really right at the architecture of the computer that makes it act intelligently.

Kildall is one of the really bright minds in personal computing. If it hadn't been for that kind of quality operating system, the personal computer would never have found a place in the home.

You heard that Grolier Encyclopedia had planned to put its encyclopedia on compact disk. Kildall's function within this is to try to put that program into the disk in such a way that you would be able to access the encyclopedia through your personal computer. These are two projects going on that should be on the market shortly. These kinds of things will make it possible for us to work at home much more intelligently and much more quickly.

Another one is the spread of smart programs into the office. The development of electronic files at the office and the development of voice processing, a particular form of artificial intelligence, will mean that I will be able to question files in remote electronic filing cabinets. I won't have to go to the office to do my work.

The smart side of this, the smart networks, will mean that much of the clerical work and much of the management work that is done in the office is going to get flattened down and ruled out of the system. Just as farms have been mechanized in the past, factories automated and our offices computerized, as artificial intelligence comes in we are likely to see a form of network organization spreading through the office like the railroads in the Industrial Revolution. It will be a loose network in which we can operate in a spread-out way.

We won't be working forty-hour weeks; we will be working to finish the job rather than fill in the time. As a consequence, in my forecast employment is going to be contracted out much more than it has been in

the past. We will begin to see employment disappear, and as a consequence unemployment will disappear. People will think of themselves more as working independently of the job structure.

Development. Human capital is probably the most interesting of the concepts of the bases of the new economics of information. If we are to be able to function in an information society, then some of the skills, qualities and values that we have developed will become perhaps less important, and new ones will have to be developed to allow us to compete in the new information marketplace by selling our skills.

The educational system as I experienced it here in Canada, as I understand it, and as I think it is generally practised in those parts of the world painted red on our maps, has generally trained us in a set of values that is anti-entrepreneurial and that gives a heavy weight to culture, patriotism, establishment values and national propaganda. My feeling is that those qualities are going to be less useful in a world where the factories are filled with robots and our jobs are more in the service sector. I feel that there is going to be competition from the private sector to bring forward an education that is much more entrepreneurial, that will teach people not traditional, institutional values, but rather how to be entrepreneurial, how to be growth-oriented, how to be constructive, how to make things happen, how to look after their own time and how to be innovative.

If that form of education and that kind of mentality begin to develop within society, then the role of the library is going to be to support that kind of behaviour. If they are going to be more independent, people will want access to more and more resources. That may be one of the factors, as Marvin Cetron explained this morning, that will be required of libraries.

I think that one of the great sources of money in the new economy is going to be the individual who is interested in paying to acquire the skills that will increase his value in the marketplace. Training, whether in an electronic form or in the form of courses personally delivered, will be one of the growth areas. I think that the library can probably serve both as a focus and perhaps as an instigator for some of this activity. Its success will depend on the extent to which it tries to support the individual in his search to develop himself rather than necessarily supporting the institution and the establishment. I see a potential struggle there, and the library should be on the side of liberating the individual from the establishment.

Video is becoming the important new medium of the post-war period. I'm referring to the video cassette on the one hand, and to video as an art form, as it's beginning to emerge in rock music videos like MuchMusic, on the other. I think that as this form develops, it will fulfill many of the categories that Wagner described music as having: it has the richness of imagery and control of the content. The possibilities for the growth of an international medium in this area are powerful, and it seems to already be fulfilling that kind of growth pattern. Moreover, the arrival of video in the

home seems to be parallelling the penetration curves that radio, television and colour television had in their day. It will become a universal device within the home.

As a consequence, more and more people are going to be spending their time looking to video to fulfill their needs for entertainment and for instruction. I think that if libraries are not moving quickly to the distribution of video, they must certainly turn to this direction.

Most of the videos are distributed by commercial "mom and pop" shops at the moment; they handle only the Top Forty material and have no understanding of the content of other material. If you are interested in taking out festival films, for instance, there is nowhere to do so in this country, as I understand it. Much of this material is available; it is a question of organizing its distribution. I think that this is an area you should look to for growth.

The second one is compact disks. I mentioned Kildall's work with the Grolier Encyclopedia. In my view, the compact disk is the ideal form for the distribution of periodicals. Many of the problems you face at the moment with copyright and keeping back issues on the shelves would be resolved if you could put the whole run of the magazine on a \$1.50 compact disk that could be printed out and loaned. You could loan, for instance, the last thirty years of **Science** magazine on one disk. That means that the person who is going to be researching that area isn't just going to get a list of the material, as he would with a search on a data base. He is getting the information itself, the actual text. He can read that through his personal computer, take the material that he wants and manipulate it within his personal computer. Before you would even get the data sent back to you by mail from a search on Lockheed or S.T.C., you could do your search, get your material, incorporate it and write your article. I think that this meets all of the requirements that Mr. Cetron gave this morning for a technology: it's attractive, it's economical, it's technologically feasible.

The last technology that I wanted to mention is robotics. Robotics is growing very rapidly in California. It is now where the personal computer was in 1975. It's being experimented with by imaginative people. Newland Bushnell, who invented the video game with Pong back in 1972, has a company that is making personalized robots. He is trying to build personalities into robots, and he believes that they have a lot of the functions of pets that would suit this world more than the actual furry animals with their distressing habits do.

That brings in an interesting idea. I think one of the next media to come along after the video medium develops will be the development of personality within computing, the imitation of life, what I would call a computer-embodied personality. There is no reason why a computer should talk to you like a talking elevator with a lugubrious voice. Personality can be built into the voice side of that computer. As it becomes developed, it will become an art form in itself, making that

computer dialogue in a rich and interesting way. There is a challenge there that I think you might watch with interest.

LISTER SINCLAIR

The electronic librarians are not going to replace real librarians with their distressing habits, are they? Oh, that's good. Some of their habits are not all that distressing, now that I come to think of it.

THE NEW MEDIUM

DR. JIM PARR



*Dr. Jim Parr is Director General, Ontario Science Centre. Prior to his appointment to the Ontario Science Centre, Mr. Parr was Chairman and Chief Executive Officer of TVOntario. From 1973 to 1979 he was Deputy Minister of Colleges and Universities. Before his appointment as Deputy Minister, he was a professor of metallurgy and Dean of Engineering at the University of Windsor. A man of broad talents and interests, he has written TV and radio scripts, and has published five books, including a book of verse, *Is There Anybody There?**

The subject is "The New Medium" and, in a word, the new medium is electrons. Now, you may say, that's not new. And, of course, it is hardly new. The electric telegraph, the first user of electrons in an information sense, went in about 140 years ago. That was the first occasion, I think, that marked a message as something which was not put into a package or an envelope or something of that sort. I do acknowledge smoke signals and Boy Scouts. But in any reliable way, a hundred and forty years ago electrons were first used to move messages. "What hath God wrought," indeed! Interestingly, with uncanny prescience, Morse took his quotation from the Book of Numbers.

You will note, too, that although codes had been used before, the way in which electrons were used on this occasion was by the development of a code. In fact, Morse may have been responsible for it; he certainly wasn't responsible for the electric telegraph.

The importance of the telegraph at that time was the speed with which messages could be moved over continents and under oceans. The Second Wave moved into its greatest acceleration because of the telegraph, which itself made a business of doing business as the transactions of the coffee houses moved into the world's stock exchanges.

Subsequently, of course, the Wired Code became unnecessary because of the use of the telephone. And radio was shoving things through the ether instead of over wires, and then came television and so on. But the electric telegraph was seminal.

Today, speed remains important, but there are three other qualities of the new medium of electrons that we should emphasize: presentation, storage, access.

One is the nature of the presentation. The electrons can be moved into pictures, words and graphics, or into sound or can remain in codes. What other senses may electrons affect? Will we have the wired head, so that messages are fed directly into us? And after that, the un-wired head — a scientific kind of ESP? One is reminded of Andre Maurois' **The Thought-Reading Machine**.

Or even of James Thurber's aunt, who would not stand underneath an unplugged electric light-fixture, for fear that she would get messages from the Detroit-Edison Company.

The electron is also a medium that permits us to **store** all sorts of information: texts, images, shapes, holographs. By information I don't simply mean facts. I mean also what is loosely called fiction. Surely Graham Greene has no less a contribution to make about what's been happening in the Roman Catholic Church than any chronological list of popes would have. So, when I speak of information I don't simply mean what are called "answers" to what are assumed to be "questions".

Access to information is through international satellite signals, whereby people can receive and synthesize information from all corners of this curved earth, and contemplate, very quickly, social and economic movements. Computer, videodisk and tape add to the armoury.

Enormous accessibility is associated with the medium of electrons.

Of course, a reasonable question is asked: "What is it that you want to transmit, present, store and make accessible?" But that is not a new question at all. It's simply made much more evident by the pervasive nature of the electronic medium. The question has always been with us.

I think, however, that a question one should ask about any new technology is this: "In what way does it create its own pressures and its own filters?" Let me give an example that is familiar to us. I think there is no doubt that the technology of the old-style classroom, the technology of chalk, talk and books, constrained the curricula. If you couldn't do it with a blackboard, a book and talking, then you didn't do it. Any kind of technology creates its own limitations as well as its own pressures. And one of the pressures of the new technologies is our desire for instant news.

The new medium is manipulative, much more manipulative than hard copy, conversation or even physical violence. The words that we tend to associate with the electronic medium are words like image, amplification, colour, hyperbole.

An overwhelming feature of finding the new medium of the electron around us is a fading of a sense of reality. It is one thing to open a manila file and see what is in it, quite another to drop a floppy disk into a plastic container for storage overnight. It's one thing to turn a page, another to push the button that sends some more words onto the screen. Accessing

from disk is one thing. The microfiche, you might say, is somewhat remote, but at least we know that the words on it are just like the words that we would see on the printed page. They only have to be enlarged. And the act of underlining as one writes is real, whereas a command to a computer is somehow remote. So we find that there is a distancing between ourselves and the real stuff. There is a kind of merging of object and image.

Many examples of this appear in the new technology, and I will give you a few. I have alluded to one, a kind of inscrutability, an aloofness, that even the friendliest friendly word processor has. One does not really feel that it is a close companion.

Let me give two more examples. Television is an obvious one. Let me take a shortcut by reminding you of the Peter Sellers movie, **Being There**. In **Being There**, Peter Sellers, who took the part of Chance, could not differentiate between life and the screen. That in itself is interesting. Much more important was the fact that he influenced people, people for whom he was the oracle. They were unaware of his aberration. The lack of distinction between real and unreal reached a second order.

For a second example, we go back to the computer. The computer has a remarkable ability for simulation. So, into the computer we feed all the things we know about the world's condition. And then we say, quite casually, "Now, what will happen if we have a famine here, perhaps? An earthquake over there? The assassination of two world leaders up in that part of the world? Perhaps a little bomb scare over here? What happens to us all?" This can be done with such casualness that it's frightening.

On a much smaller scale, but no less influential, is the high school laboratory experiment. There are test-tubes, burned fingers and the queasy dissection of frogs. But on the computer one can type it in — and one will soon be able to say it in — and be able to see a response which is much more reliable, much more susceptible to manipulation and flexibility, much less dangerous. Hard reality has been displaced by software. There is a fading of the sense of reality.

As all this is going on around us, funny things are happening in physics. No longer will one theory do; many theories will do, as long as they are self-consistent. Meanwhile, one of the greatest theories of all, Goedel's Theorem, tells us that a self-consistency of theories is impossible. We are left with remarkable doubts. We are told now that the answer depends upon the style of the question. Fritjof Capra wrote engagingly about this:

Basic structures of the material world are determined by the way we look at this world. The observed patterns of matter are reflections of patterns of mind.

Shades of Bishop Berkeley! Echoes of James Jeans when he said that the universe begins to look more like a great thought than a great machine. Now, this lack of differentiation between mind and matter that is currently upsetting our physicists and pervading all our thoughts is a very

difficult thing for the Western mind to comprehend. It's very unsettling. We were happy with Newtonian physics. We were even happy with the promise of a kind of universal theory that Einstein offered. They were anchors. And now physicists seem to tell us that the traditional anchors don't exist. With all this (not surprisingly, because one generally finds that these things are all of a piece), we find strange unrealities, models, images, fleeting paradigms, the hype and the codes of the new electronics, the new medium.

The title of this panel is "New Directions in Technology". I would like to misinterpret that title. The technology is pretty well in place and is predictable for a while. Really, the title asks us, "What are **our** new directions in this technology?", not what the directions of the technology itself are. I'd suggest that our new directions have to be to mark a path between content and image, to differentiate between reality and paradigm, to move between metaphor and solid marble, to enjoy the unreal as well as the real — because this is the unique and poetic joy of the human condition. If one is prepared to accept that sort of thought, then the libraries have a special place, because they can catch the excitement of electronic imagery, fringy poetry readings and funny professors, as well as offer quick access to electronic information.

In addition, we have to realize that any line of direction needs two points; the library can provide us with the second one. The other point, of course, has to be set in the past. This age of new and fickle media requires the library in its old sense, as memory: the library must preserve historical co-ordinates scrupulously and courageously. To do anything less shifts us into Orwell's **Nineteen Eighty-four**, where the past is rewritten to justify the present, and where Newspeak (now electronic, of course), vigorous and intensely manipulative, constrains language. Independent thought is inhibited and original ideas may become inexpressible.

I realize that 1984 is past us chronologically, but we should remain on guard, because it is not necessarily behind us.

LISTER SINCLAIR

It is salutary to remember that the horrors of **Nineteen Eighty-four** actually take place in a book that was written in 1948 without any computer technology. Computer technology was not known at the time, and it is not in Orwell's book.

It seems to me that art, science, magic and religion, which I mentioned this morning, are being mentioned again. Those are some of the ways we perceive the world.

I can't resist telling you that the only way I can remember who Bishop Berkeley was is that he was the fellow who wondered if there are sounds in the desert when there is no one to listen, and if the tree is still there if there is no one looking at it and so forth. I remember this because there is

a limerick enshrining this view, namely, that all these things are really in the mind of God, which is Berkeley's solution, because he was a bishop.

*There was a young man who said God
Must find it exceedingly odd,
If He finds that this tree
Continues to be
When there's no one about in the Quad.*

Fortunately, there was a reply:

*Dear Sir: Your astonishment's odd.
I am always about in the Quad.
And that's why the tree
Will continue to be
Since observed by yours faithfully, God.*

THE AUTOMATED WORKPLACE



FRANCIS McINERNEY

Francis McInerney is a co-founder of Northern Business Information, based in New York, with a Toronto office. Northern Business Information is involved in competitor intelligence and publishes the results of its investigations in reports and assessments for industry. Among the firms researched by Mr. McInerney is IT&T and Northern Telecom.

We've heard quite a bit from the panel about whether or not you are really in the knowledge business, the information business or the materials handling business. Those are very big questions.

Jim Parr talked about presentation. I think presentation has a lot to do with the kind of business you are in. It has a lot to do with the future of the so-called automated workplace. Presentation is fundamental to the interaction of people with the kind of information that they receive.

There are individual technologies which, by themselves, can revolutionize industries like yours. CD Rom, which is the trade name for what we have heard discussed here by several panelists, consists of compact disks with a ton of data on them. They can hold an entire encyclopedia, which can be updated monthly if you want. This kind of thing will have an enormous impact on everything from how you store information to how you retrieve it, manipulate it and so on. And it will have an enormous impact, in addition, on the way your clients interact with you.

As far as the automated workplace is concerned, where presentation really gets down to the fine detail of how people will work and what they will work with, we are seeing serious problems in industry today. While I do agree with Ian Barrie that you want to get out there, that you want to know what the technology is (and you had better know what the technology is), that you have to grasp it with both hands and run, I should add that we are entering a hiatus. We have seen several forces enter the market which, I believe, are going to slow development down for at least

five years, until 1990. So, after the rapid change of the last five years, we have significant breathing room.

This slowdown is due to confusion generated primarily by serious difficulties that the manufacturers are having providing you with products that work. You will hear a lot of claims and a lot of nonsense. "My product does this, their product does that." But if you look very closely, you will find that the manufacturers are having problems making different data-processing systems work together. IBM cannot even make its own products work together, and that is a cause of great concern, especially for countries and institutions which have invested hundreds of millions of dollars in IBM equipment.

The result is confusion in the executive suites of major companies all over North America. This is compounded by deep concern about the pollution of data bases by the proliferation of personal computers. In many cases, these personal computers are incompatible in structure, operating system and in every other major way with the company's most important data processing systems. There are so many of these things out there that data base utility relevance is out of control. These computers are bought on low-level departmental budgets. They're completely wiping out management's ability to bring about a migration, a policy migration if you like, from one stage of development in the firm to whatever it thinks the future might be.

Of course, a lot of these people are your clients. These are the people that you have to serve in one way or another. Alternatively, and this is something which Ian Barrie brought up, they could be your competitors. You are facing a situation very much like that of a post office, with substitutable and comparable goods and services out there. You are going to have to know how to respond to those goods and services.

One of the big problems with this confusion is that most organizations do not have the people in power with the kind of knowledge required to make it all work. They do have management information systems managers who have traditionally run the data-processing room and, in some cases, a lot of the terminals and access equipment attached to these things. But most PCs are under no one's control.

We are going to see major corporations around the world trying to re-introduce some order by adding to the traditional trio — chief operating officer/chief financial officer/chief executive officer — the new position of chief information officer. Over the next five years, this organizational development will allow companies to incorporate or respond to the new questions of presentation Jim Parr introduced.

I want to move to the most important aspect here, one that Robert Russell brought up. He looked at the possibility of loosely defined networks. This is a very real development. We are moving right now from a situation where data-processing systems that were all application-specific proliferated over twenty to thirty years. You had a need — accounts receivable, for example — and someone designed a

system, hardware, software and an application program which went with that need. You didn't use the system anywhere else. Now we are seeing very broadly based needs. Companies are giving tens of thousands of people access to different data-base systems. These people have the most varied needs in terms of frequency of access: what they need, when they need it and how it's got to come to them. Companies like IBM never planned for this. Until a couple of years ago, it never occurred to them. IBM has had serious problems down at its research labs in Raleigh working on this. It is a major concern for the company and IBM makes no secret of it.

How does a company like IBM, which has segmented its markets endlessly over the last thirty years and provided dozens of different application-specific products, now try to blend these products together in a way that is simple and easy? And in a way that allows manageable presentation to those working with these systems in the everyday workplace?

There are two general approaches to this problem. Robert Russell says he thinks we will have loosely based networks. IBM does not think so. IBM thinks we are going to have closed architecture, tightly coupled systems that work within a well-defined set of specifications. Two firms do believe in loosely coupled networks: Northern Telecom, our own firm here in Canada which has done pioneering work in this area, and AT&T.

In your business, you are going to see a lot of new stuff in the next few years. You have already seen a lot. But now you are going to see a lot of hype, a lot of words, a lot of everything.

You only need to follow three companies to know what is happening in the workplace: Northern Telecom, IBM and AT&T. On the face of it, the only real difference between them is a matter of market power. IBM is big; therefore, what Northern Telecom says will happen may not.

I am not convinced, however. I think we are facing a situation where networking is the byword. If the networks of one supplier don't work with the networks of others then the supplier is dead.

IBM has serious problems in this regard. It has 750 engineers working on these problems right now. IBM has 287 separate types of keyboards, and most of the terminals that those keyboards are attached to are what we call dumb, or fixed-function, terminals. The problem is that if you hit a given key on a dumb terminal, that key sends a specific piece of information down the tube. But with 287 different formats, there is no commonality. Since the terminal has no intelligence residing within it, the terminal itself cannot be reconfigured. IBM's interim solution to this problem is to send all its users little plastic templates that they can stick over the key pad, and little decals they can stick on top of that. Anyone who has used a terminal knows what kind of mess that will turn into in a few months. With some thirteen or fourteen million terminals out there, in 287 different types, this is hardly a workable solution.



This is a difficult period of transition for you. Once you were information providers. Today, you must choose between becoming materials handlers, and using advanced robotics to do that, or becoming knowledge generators, a completely different business. During the change, an enormous power monopoly is developing in the market. For example, General Motors just bought EDS, a data-processing company. General Motors has done a tremendous amount to pioneer robotics and so on and is now in the process of dictating specifications to suppliers.

This is a complete reversal of traditional roles. General Motors is big enough to say, "This is the spec and you meet it or you're dead." Believe me, that is frightening the daylights out of companies like IBM, because they know that they can't meet the spec, and they know that there is no power on earth which will let them meet it any time within the next five years.

Endless problems will result. Du Pont is doing the same thing. So, if you are very unlucky, you are going to be caught right in between. The D.P. suppliers aid their customers as they fight for control of the market. It is not clear today which suppliers will dominate and what kind of architecture they will use. There are some companies, like IBM, that are working very hard to make presentation a fixed rule which they want to ram through the entire system. This makes it very difficult for anything else to work.

For the next five years there will be a lot of questions, a lot of new market forces, a lot of new factors. You will be in the middle. You have a lot of very hard choices to make, and I don't envy you one bit.

LISTER SINCLAIR

That was very stimulating. I am fascinated by the notion that it is a major achievement to get things to work. For a long time, the only radio telescope in the world that actually worked was the Jodrell Bank telescope. There were others, larger and smaller and so on, but it was very difficult to get any results out of the damn things. But they actually succeeded in getting that one, with all its apparent faults and creakiness, to work. I think that is very important.

PANEL DISCUSSION

LISTER SINCLAIR

I have a number of questions here.

Would the Ministry consider setting up a pilot library as a role model to explore and test new concepts of service foreseen for 2000?

Each of the panelists has implied that a future looms in which the worker will not be alienated by work but from work as we currently know it. This has obvious economic ramifications which will have consequential effects on society. What is the library's role in this seemingly inhumane social context?

JIM PARR

I would have to put it in the context of asking why it is that we think that work of any sort — whether we are alienated from it or not — is so essential to our existence? It is quite a recent thought. I think Ivan Illich pointed out that it wasn't very long ago that it was a sign of failure if a person had to go out to work. He wasn't speaking just about the rich; he was speaking about all cuts of the community. This is why the tinker was so despised: he had to go **out** to work.

And the habit has caught on. I can only respond to the question by saying that I can't understand the premise on which it's based, because it seems to require, one way or another, that **going out** to work is essential to our existence.

IAN BARRIE

In the industrial area, we come up with this question all the time. It is a difficult question to answer. In the past, we have seen it in agriculture. Forty to fifty per cent of the population worked in agriculture; now it's two or three per cent. We have a high unemployment rate, but we certainly don't have a thirty-five to forty per cent unemployment rate.

The definition of the technology is automation, and automation is reducing the amount of labour in part, so the number of jobs per component or per part is reduced. But what you hope to do is to build more components and more parts and enter a bigger market.

In the Northern Telecom example I used, the company is selling two and three times more phones today in this particular market than it was three years ago. The plant is at the same population with the new phone as it was with the old phone, but it is producing a lot more phones.

There is no black and white answer. The technology is going to cause a change, and our job is to make that change as smooth as possible.

LISTER SINCLAIR

Isn't it right to say, however, that there is more job satisfaction for those people who work as a team and build a finished car from start to finish, rather than the same number of people working the same number of hours doing single jobs on a production line?

JIM PARR

Yes, I believe it's been proven.

ROBERT RUSSELL

We were talking about networks. I brought it up and Francis McInerney developed it. I'd like to take it a step further. What Lister was referring to is the satisfaction that comes out of teamwork. The jargon word for teamwork now is network. If many of the stupid jobs, jobs that have to be done but are routine and can be performed by machine, are taken over by machines, then the remaining jobs change their character. There is less administration to do. You're not spending so much of your time looking after the problems of two people doing stupid jobs and conflicting with each other. Much more of the nature of your work becomes network.

As I look ten or fifteen years into the future, it seems that the hierarchies that we have constructed (and that Parkinson saw as inevitable when he phrased his law back in the '50s) now appear to be needless. The nature of the work that we will be doing will change much more to collaborative efforts to reach objectives on a project or longer-term basis.

Work, then, becomes more like play. It becomes more satisfying, more like team play. As you get to know the people with whom you are working, you feel that you can leave them to go and explore something for a period of time. They'll call you if they need you, and you can call on them if you need them. You are a common group working for an objective that you've all agreed on. I think this brings back the spiritual content of work that was lost in the Industrial Revolution. It is very difficult to believe in work as we have known it for the last 150 years. Thank God that period is over.

JIM PARR

Ian Barrie gave a statistic that is correct but not complete; that is, the number of people working on the land dropped from 50 per cent to two or three per cent. And then Robert Russell spoke about the satisfaction in jobs. I think the two are related.

It is true that the number of people working on the land dropped from 50 per cent to two or three per cent. But the proportion of people engaged

in getting food into bellies has not changed very much. There are the people in the processing plants and the packaging plants, the people making steel cans, the people making transport trucks, the people looking after the roads, the people in the fast food outlets and so on.

It may well be, however, that the situation has changed for the better in a materialistic sense, but not in terms of our satisfaction. I think that's what Robert was alluding to. The satisfaction may be much less because we are remote from that rather intuitive requirement of getting food.

FRANCIS McINERNEY

I find the idea of alienation from or by work difficult to accept as a rule anyway. It certainly wasn't my suggestion; I don't believe that we are going to see massive numbers of people alienated from work. I am absolutely convinced that, contrary to what most people would think, we are going to have a very exciting and very interesting future.

LISTER SINCLAIR

A friend of mine who is an anthropologist always points out that learning any language is simply child's play, and that the Rachmaninoff's Third Concerto is very difficult and brutal, but nobody works it. You play it.

Presumably, the word work is applied to something that we are doing but don't want to do; if we do want to do it, it's play. In my profession, I've found myself filming in strange places. One day, I was standing among the ruins in Tical in Guatemala, and a King Condor flew over, and I thought, "They're paying me to do this." I think we all have that sense.

At the same time, I think we should not forget that there are people in our society who do in fact live a life of toil, labour, carrying out activities in which there really is no fun. Stupid work, as I think you mentioned.

Let me read some more questions.

Admittedly, the future may seem far away, but can you see the future of a computer bank, i.e. HAL, in a library?

Can anyone see that? I think the question alone is worth the price of admission. Just to hear the question is rewarding.

I'll move on to another one.

So far, you have discussed libraries as information delivery systems and, briefly, as memories. But do we still function as a source of entertainment, or have we already been eclipsed by the screen with its ready-made imagination? Do people still read for pleasure? Do they have time to read for pleasure? Will they in the future?

JIM PARR

I hope that I'm not the focus of that kind of accusation. I think I was careful to define, however briefly, what I meant by information. My definition included all those wonderful things which the question implied the library should be doing.

LISTER SINCLAIR

Yes, I think we were talking about information in the broad sense; namely, **War and Peace** is information, **Hamlet** is information. All these things are information.

ROBERT RUSSELL

I'd like to say something about that. I've been working on a book for the last little while. For the last four months I've been living like a hermit at home. My only trips outside seem to be to the fast food service shop across the street and to the Metro Toronto Library, which is just around the corner.

I guess I have read a couple of thousand books in the last two years. Two of them were novels. One of them was **The Name of the Rose**. I wanted to read it because I wanted some insight into the monastery of the middle Middle Ages because, in many ways, a secular monastery may be one of the answers to how we are going to use people if technology moves in too quickly and we can't find work.

The second novel that I read was **The Sorrows of Young Werther** by Goethe; I wanted to read it because I was studying the Industrial Revolution. At the same time, I have probably seen about twenty or thirty novels serialized on television during that time. I think that is my most intense entertainment pleasure. Each week, as these things go on, as that pleasure builds, it becomes sweeter.

A great deal of experimenting is going on in that field. There was an all-day session when C-Channel was broadcasting **Nicholas Nickleby** and I remember spending a whole day watching that. I think it was probably as thrilling an experience as actually seeing it in the theatre for a whole day. Recently, there was a series called "Tinkle" that ran for thirty-five episodes over a period of weeks on one of the pay channels. My wife and I watched that with great interest.

I think that the novel is moving more and more to the screen, and that its power to capture people's imagination is growing.

I remember meeting people in Czechoslovakia who had seen **The Forsyte Saga**, which I guess is the story that started the serialization of novels. These people's understanding of Britain dates from the experience of seeing this novel of the British mind and its mental origins

on the screen. This has an enormous impact on our society.

Could that not be your business? Why are you not in that business as well? Why did you decide that you were keepers of books and not of filmed versions and video cassettes of these novels?

LISTER SINCLAIR

Very good. It's not entirely frivolous. In fact, it's not frivolous at all. I would like to remind you that **Nicholas Nickleby** originally appeared in thirty-five or forty episodes. It was intentionally written that way.

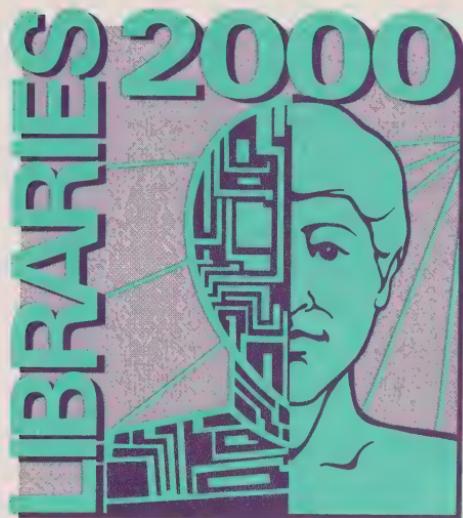
I'd like to leave these two questions with you.

What values are taught now which discourage entrepreneurship? What values would have to be taught to remedy this? Are patriotism and entrepreneurship mutually exclusive?

Selling our skills outside a job structure is all very well for those of us in the developing class structure who are on top. But those on the bottom of this structure may be unable to present themselves as small entrepreneurs. Where does this scenario allow for the average person? It seems to me that Mr. Russell is speaking of the intellectual, cultural and economic elite.

He isn't.

FUTURE OF CANADIAN SOCIETY



FUTURE OF CANADIAN SOCIETY



JOHN KETTLE

*John Kettle is one of Canada's leading futurists. A consultant to governments, research centres and major business corporations in Canada and the United States, he is also involved in business publications. For many years he wrote regularly for **Executive** and other publications. He founded and edits **The Future Letter** and has written or edited a number of books including **Footnotes on the Future**, **Hindsight on the Future** and the **Big Generation**.*

We talk about being swamped by information, about an information explosion. My own view is that you need a lot of information in order to understand anything that is going on at all.

I'm going to speak about the largest phenomenon in Canadian history, measured demographically: the Big Generation. The Big Generation refers to the people who were born in the years 1951 to 1966.

I want to start by talking about fertility. The history of fertility in Canada is a history of decline. The Europeans who came to Canada started to displace the original inhabitants by a high fertility rate. They chose women who were strong, able and willing, and on average these women, or so it was said in the census in 1666, had ten children each. That's on average. That's doing fairly well. The intent was to populate Canada as rapidly as possible.

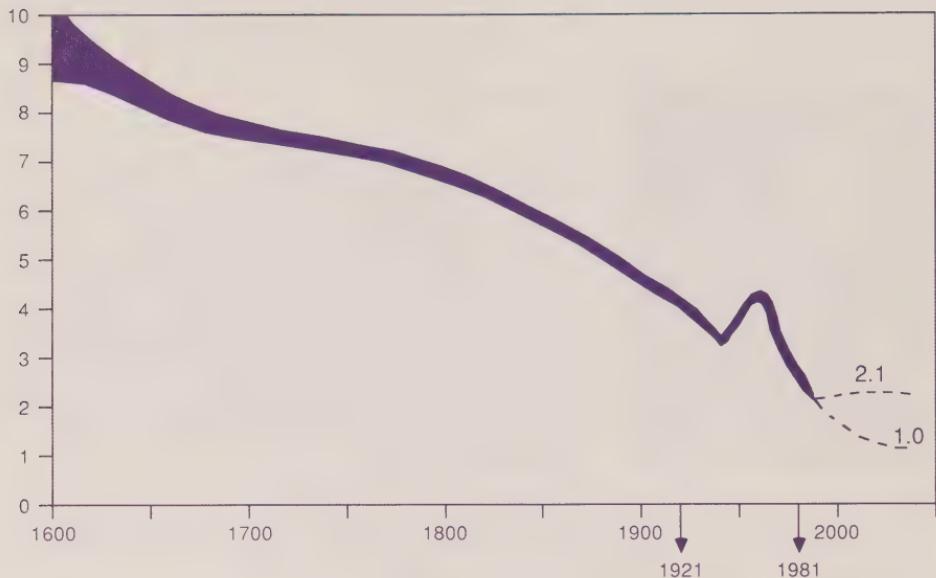
The idea didn't last very long, but it did get us off to a flying start. Since 1666, fertility has dropped. It has dropped from ten children per woman to five children per woman, to four, to three and, during the Depression, which you can see on the chart as a kind of valley, to about two and a half children per woman.

And then something unexpected happened. Starting in 1939, that line starts to go up again for the first time in more or less 350 years. It went up for about twenty years, and then started to go back again.

FERTILITY IN CANADA, 1611-2026

Number of Children per Woman

Number of Children



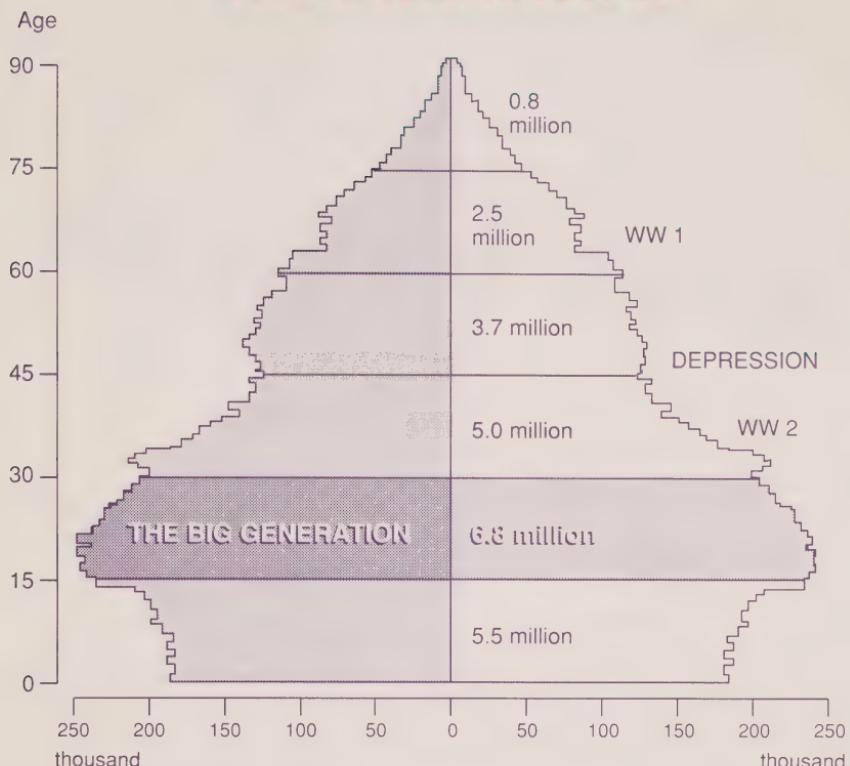
The jump in the chart was quite unexpected. We started to have large numbers of children. You can see a picture of the population of Canada in 1981, the last time anybody was able to do a serious count. It shows, slice by slice, starting at the bottom, people aged under one year, then another for people aged one to two years, then another and so on. Under that solid line are all the people who were aged under fifteen in 1981. I call them the Little Generation for reasons which will become obvious in a minute.

Between that slice and the next slice are the people who were aged fifteen to thirty, that is, the people who were born between 1966 and 1951. Then you get various other slices.

You will notice a couple of things that are worth mentioning. The post-war baby boom was a small event; it happened in 1946-47. It happened when they let the men out of the army, and the men came home and said, "At last!" Or some of them came home and said, "At first!"

In a period of about eighteen months, a significantly larger number of children were born than had been seen during the '30s, during the Depression years. Then it began to fade out. Then, starting exactly in 1951, we reached a point where we had more than 400,000 children a year. That persisted for exactly fifteen years. It is very neat for statisticians because the census was taken in 1951, in '56, in '61 and in '66. We had three five-year periods in which births exceeded 400,000 a year.

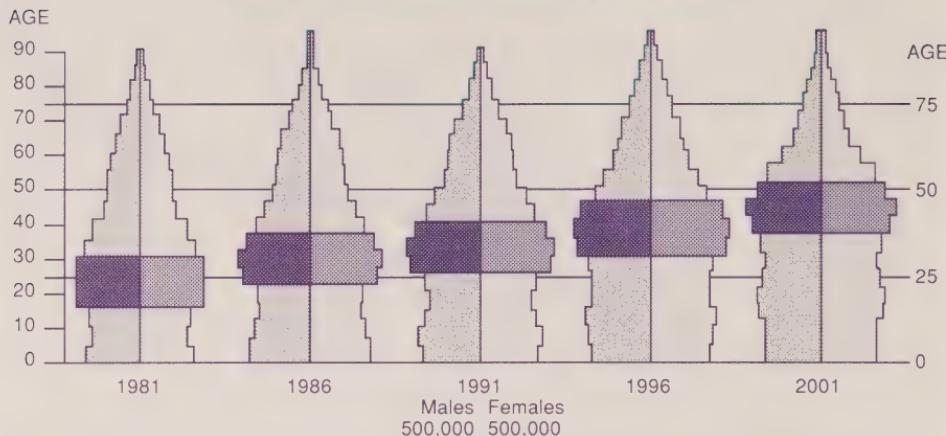
CANADA: POPULATION IN 1981



Let me tell you how to think about the Big Generation. In the fifteen years before, from 1936 to 1951, five million children were born. In the fifteen years after, five and a half million children were born. The way things ought to have happened, five and a quarter million children should have been born in the middle. Instead of that, as you can see, we have a big bulge on the chart of six and three-quarter million, or one and a half million too many. If you are in that generation, you know what I mean. This generation is from 25 to 30 per cent oversized. If you tried to get into high school in the late '60s or if you were looking for a job in the '70s or '80s, you'll understand exactly what's meant. Where there should be three people, there are four. It has created a problem.

Here is a forecast of where those children are going as they become young adults, as they become adults and as they eventually become middle-aged. Here is a forecast made by Statistics Canada using, I would say, a higher than reasonable fertility forecast: Statistics Canada expects family size to drop below 1.7 children about 1996. Well, surprisingly, it happened to reach that figure last year, so we are about ten years ahead of the forecast. On the other hand, the figures don't allow for as many immigrants as we will probably get. So the shape and size are roughly right.

THE BIG GENERATION ON THE MOVE



The steps in these age-and-sex pyramids are each five years high, so the pyramids are like coarse profiles of the population. The fact that more babies are male than female shows up; so does the fact that after about age 55 there are more females than males. The Big Generation makes a very noticeable bulge as it moves up the pyramid.

Let me point out some things. We call these “population pyramids” for obvious reasons: they are small at the top and wide at the bottom. They don’t fall over. Populations have always been thought of in that way. That is, a few wise, old people at the top and many young, stupid people at the bottom. It was the inspiration for the organization of the army: many, many young people at the bottom, running about being told to go and get killed, and a few wise old birds at the top doing the telling.

This is probably the inspiration for the organization of the church, the corporation, the CBC, the Board of Education, anything else you know that's got more than three people in it. We like the idea. We think there should be many young people doing what they're told and a few old people doing the telling.

If you look on the left, you can see that for the first time in history — and in Canada this trend is more pronounced than in any other country in the world — this pyramid is gradually beginning to turn upside-down. You asked me to stop at 2000, but if you go on to 2030, you can get an upside-down pyramid — many, many old people at the top, people we hope are wise, and very few young people at the bottom, who are certainly not going to be paying into the Canada Pension Plan.

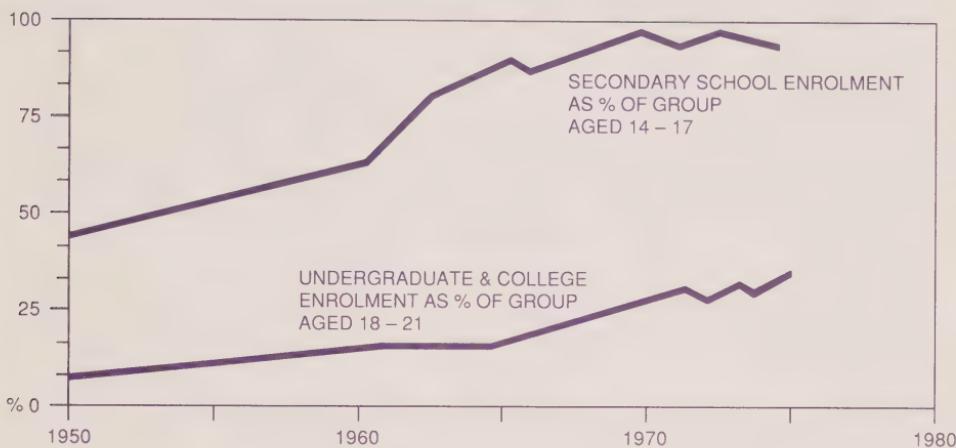
This generation promises to turn the population pyramid upside-down, and in the process it will probably turn a lot of other things upside-down. It will certainly destroy the social security system. It has more or less destroyed the public school system. It is in the process of destroying the labour market, though that may survive. It is doing terrible things to marriage; it is doing awful things to people who used to sell blue jeans and now can't. It has done amazing things to rock 'n' roll stations, which

are going off the air or turning into something else. Everybody had assumed that this kind of pyramid shape would go on forever, that the country would just go on getting bigger and bigger. And now we see that it is getting smaller and smaller at the bottom.

This generation turns the world upside-down.

And it won't go away. There is a high probability that these people will be the dominant population at the end of the century and every likelihood that they will dominate society twenty years into the 21st century. Numbers are very important, but a number of other things happened to these children as they were being raised.

ENROLMENT: THE POST-WAR REVOLUTION



These children became the first high-school generation in Canadian history. Some of you are old enough to remember the years before the Second World War or the years right after the Second World War. This chart shows that in 1951, just under half of the people aged 14 to 17 were enrolled in high school. In other words, it was the privilege of a minority, a very large minority.

In 1951, in a kind of euphoria, we decided that elementary school was not enough for this majority. We said, "Let's make high school the common education instead of grade school." And we set about doing it.

In twenty years, by 1971, we had in fact reached 98 per cent enrollment. Now, that's a revolution. It's a thing you can do only once. We more than doubled the enrolment rate in 20 years.

At the same time, if you look at the line at the bottom of that chart, the same kind of thing began to happen in post-secondary education and has gone on. Before the Second World War, about five per cent of people aged 18 to 21 were enrolled in colleges and universities. That went up to

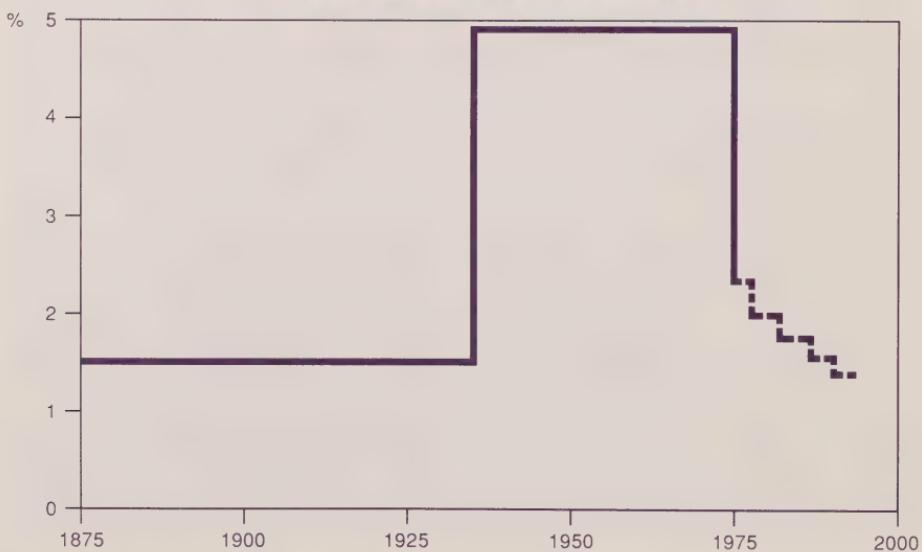
10 per cent after the war because of the veterans. This figure has continued to rise, from 10 to 20, to 30, and now 37 per cent of people aged 18 to 21 are enrolled in college. And they are being brought up not on newspapers but on the videoscreen. These people are being taught a subject by computer, and will in fact begin to learn more and more that way.

So this educational revolution has gone around not once but twice. Education has gone from being the privilege of a minority to being, essentially, a fact of life for everybody. And it has switched from print to the cathode ray tube.

In 1961, half the adult population had only grade school education, and only 10 per cent had post-secondary education. If you were in libraries then, you know what was being taken out, and you know who was coming in to take it out. By 1976, that had begun to shift. The biggest change was that 30 per cent of the adult population fifteen years later had post-secondary education. Most of it was college, some of it was vocational school. The proportion with elementary school was only 12 per cent. And StatsCan's forecast is that by the end of this century, by the year 2000, only 10 per cent of the population will have only elementary school education and 40 per cent will have post-secondary education. Considering the trends we saw just previously, my guess is that it is more likely to be 50 per cent with post-secondary education.

This is an important factor for us to think about. We see a population that is changing underfoot. First of all, a very large number of people, now in the twenty to thirty-five age group, will be in the thirty-five to fifty age

LONG-TERM GROWTH OF REAL INCOME PER PERSON



group by the end of the century, and a high proportion of this group is very highly educated.

The second thing to say about the Big Generation is that it is the only generation in Canadian history that was brought up in an economic boom. That boom was an extraordinary, one-time event. It is difficult to get data on the Canadian economy until about 1920. What you get before that is spotty, so this chart includes, I regret to say, a fair amount of fudge.

I estimate that from 1875 until a little bit after the Second World War, real income per person grew at about one and a half per cent a year, which means that it would double in forty to forty-five years. In other words, in about a working lifetime you could expect your income to double. If you started working at \$10 a week, which people did in those days, you would finish your life earning \$20 a week. This would give you some sense of progress but not very much.

In the period after the end of the Second World War to 1973, the growth of real income per person was five per cent per year, which means that it doubled in fourteen years, quadrupled in twenty-eight, and would have multiplied eight times, if it had gone on long enough, in forty-two years. You would have started work at, say, \$100 a week and you would have finished up earning \$800 a week if you had worked for the forty-two year period. That would be progress.

In that period, the whole of the Big Generation was born and raised and reached at least teen age. In other words, they had already become quite self-aware and had begun to think about me and them, inside and outside, and how the world works.

What they knew was that daddy got a five per cent raise every year on average, plus inflation, and that every year something new happened: if I want a toy, I get it by my birthday, if not by my birthday, then by Christmas. And isn't it nice that we had one holiday last year; this year we're having two. We had one car last year; next year, two. In other words, they were raised in a boom, and they are the only children who ever have been. That generation has a great deal of self-confidence and very high expectations.

If you were raised in the Depression, you probably still turn the light off when you leave the room, clean your plate at every meal, and save pieces of string and jelly jars. The habits of saving, taught by poverty, stay forever. I don't need to finish up my plate, nor do you. But what you grow up with as a child is what you think is normal.

It is normal for this generation to think that the economy is going to go up and up and up, and that the economy is abnormal when it doesn't. As for the Depression children, it is normal when the economy goes down, it is nice when it stays level and it's amazing when it goes up. That's a different kind of picture.

The third point I'd make about this generation is that it is the first TV generation. In 1950, about one per cent of Canadian households had

television; in 1952, CBC started a national network. You no longer had to tune into Buffalo across the lake. Suddenly, at the very beginning of the Big Generation, TV happened.

TV was invented some time in the 1930s but they kept it back for the Big Generation. The Big Generation grew up with it. First of all there were one or two channels, then more, and before the Big Generation was even out of its teens, there was an absolutely enormous change in television. We are looking at cable, we are looking at pay TV. We are looking at children who have access to thousands of hours of television information per week, who know how to flip through the channels and pick up a bit here, a bit there, who will learn from television things which their parents don't know, wouldn't tell if they did know. The normal life of the North American family — adultery, incest, murder, rape, struggle for power, all of these things are on — the afternoon talk shows, the soap operas; this stuff tells them exactly what is going on in the world.

The children have a very good picture of this. They have a strong picture that is filled with emotion and drama, that is much more interesting than school, in many respects more interesting than family affairs at home, more interesting than most of what is happening on the street. We begin to see a change taking place in these children as they are socialized by different means. Even the toys they play with and the games they play now appear on the TV screen.

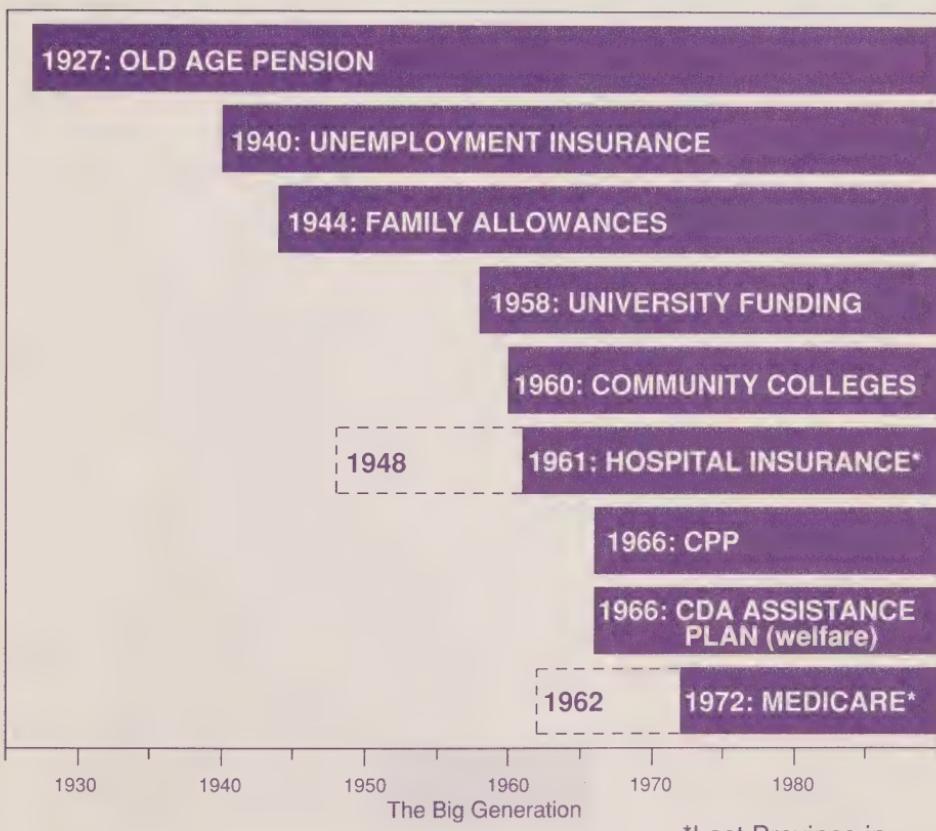
This is the first generation that suffered divorce. It is difficult to get a count, but nearly 40 per cent of the children of the Big Generation have seen their parents divorce or at least separate. This happened very quickly. Divorce rates were quite low until the Second World War. The war caused a big jump, but then the divorce rate settled back down again to about where it had been before the war, maybe a touch higher, and stayed flat through the 1950s and 1960s until the pressure began to build for easier divorce. In 1968, the Divorce Act was passed. The next year, the divorce rate was twice as high as it had been the year before; three years later it had risen by that much again. Six years later, it had doubled again. There were enormous numbers of divorced people.

Something happens to children when they go through a divorce. It is unlike affluence, but it is alienating as affluence is alienating. It is alienating to find that your mum has run away to live with another family. It is alienating to have a lot of money. Kids used to take out the garbage because they wanted the ten cents that you got every week. Now kids who are told take out the garbage say to mum, "Dad wants me to take out the garbage but I have to do my homework" and mum says, "I'll take it out, it's just as well that you study." And that means that the kid is going to get the buck at the end of the week anyway. Affluence makes a big difference to how children think. Divorce alienates even more thoroughly.

The next thing I want to say about the Big Generation is that it was the first welfare-state generation. It is, again, as if the world had waited to bring on an extraordinary social change, one which would crack the

mould and change the way people thought, until the Big Generation came along. At the time when they were born, there wasn't much social legislation. Unemployment Insurance and the Family Allowance had started. The Old Age Pension had begun in 1927, but there weren't many pensioners. Just as the Big Generation began, we started hospital insurance. By the time the last of the children were born, it was in place. We started university funding. We said, "Oh, there they come. Let's get something ready for them." We started community college funding. We started medicare, a very important factor in the life of this generation, the first time ever that every child in the country could see a doctor. It started in 1962 at the height of the Big Generation boom, and by the time the oldest child was still a teenager, it was in place everywhere.

CREATING THE WELFARE STATE 1927 – 1972



We brought in the Canada Pension Plan in the last year of the Big Generation. The Canada Pension Plan depends on having a normally shaped population pyramid — more young people paying in at the bottom than old people taking out at the top. That pyramid was, finally, fundamentally shattered. You couldn't have brought in the Canada Pension Plan three years later. Even Ottawa would have understood that it wasn't going to work.

And we brought in the Canada Assistance Act, which means that federal money is going into welfare.

By 1966, the whole thing was in place. We have essentially done nothing since. People understand that that Big Generation is a time bomb, ticking away.

This generation is the first to grow up with cradle-to-grave assurance that nothing can go wrong. You can't really suffer; we'll give you medicine to help. You can't be cold and wet and hungry, because we've got something that will help you out. You are entitled to an education, because we have something that's going to give it to you.

I think it is absolutely a pinnacle of human civilization that we have done this, installed this social safety net. It has had a big influence on the Big Generation.

I have now listed five things that can be said about that generation and could add twenty more. But they are enough, I think, to assure you that these social changes which happened in many parts of the world, but hit our Big Generation at those crucial formative years, made it possible for them to become a new kind of people. In fact, it made it very difficult for them to do anything else. It became impossible for parents of the Big Generation to pass on to their children the traditions in which the parents were raised. For the first time, the children said, "That's really not true. It doesn't apply. What do you mean 'save', there's all this money running around. And what do you mean, 'Keep your nose to the grindstone,' I'm already twice as well educated as you are."

Many of you will know Maslow's Hierarchy of Values. Maslow says you have to nail down the most fundamental value before you can go on to the next. You have to survive before you can be concerned with issues of security. Survival has not generally been an issue in Canada in this century. A few people have faced it but not most, whereas in the last century it was a real issue for many people in the West and even in the East: "Will we survive this winter?" In this century, security has been an issue but we had that fixed by the Second World War.

Then we get issues which have come up relatively recently, like the issue of self-esteem, being valued for who you are. That is an important value. You can't deal with it until you belong somewhere. And finally, we get what Maslow says is the peak of this hierarchy: self-actualization, self-development. He said this in 1954, not expecting, I think, that many people would reach this level, but that it would be the achievement of a tiny, privileged minority.

My contention is that the events of the post-war years have allowed nearly all the post-war children, the Big Generation, to climb that pyramid to the top. Half of them probably are not comfortable with it, and may slip

THE BIG GENERATION

(born 1951 – 66)

MORE:

- **EMOTIONAL**

- **INTERESTED IN EXPERIENCES**

- **CONCERNED WITH SELF**

- **RIGHT BRAIN**

- **ICONIC (picture)**

- **PROCESS-ORIENTED**

- **ENTREPRENEURIAL**

- **CONCERNED WITH LIFE & LIFESTYLE**

LESS:

- **RATIONAL**

- **INTERESTED IN POSSESSIONS**

- **COMMUNITY-BOUND**

- **LEFT BRAIN**

- **LITERATE (word)**

- **GOAL-ORIENTED**

- **MANAGERIAL**

- **CONCENTRATED ON WORK**

back and say, "I don't know. It's too soon. I'm not really that independent of everything. I have not completely cut myself off." But my guess is that

a third to a half of the Big Generation, and that means at least two million young people, are in the position where self-development is the main issue for them.

I think that is a very important change. It means that this whole generation is behaving as the educated aristocrat of the eighteenth and nineteenth centuries behaved, making decisions that are based on a personal ethic and on personal achievements, not on community values.

This is the first generation of which this is true. The fact that it is one and a half million oversize, that there are nearly seven million people who are in line to do this, will make a lot of difference to society.

I want to make a couple of generalizations about these points, to tell you what I think is going on. I don't say that the Big Generation is only selfish and is not bound to the community, but I do say it is more concerned with self (I would not use the word selfish) and less bound by the community than any previous generation as a whole. I guess religion has dropped dead for most people in the Big Generation, as it may have done for most people outside the generation by now, at least for two-thirds or three-quarters of them.

In the Big Generation, if there is a religion, it would go something like this: I was born with a certain potential and it is my duty to develop it to the fullest extent. They may add, "so I will have something to give to the community", or they may not make that qualification.

And they are more emotional, less rational, not irrational, but more open to emotions. A lot of things have to do with that, for instance, Dr. Spock's **Common Sense Book of Baby And Child Care**. More right brain, more intuitive, less left brain. Not illogical, not lacking in left brain, but more direct, more open, more willing to deal with sensitive areas. More iconic, more affected by pictures, less literate, less affected by words. This has been said to you all day. More process oriented, less goal directed, less linear in this sense. More entrepreneurial, by which I mean innovative, ready to take risks, often interested in starting things, not necessarily tough business things, but entrepreneurial. Less managerial. Not only less capable of managing, but less interested in being managed. Less interested in being part of that chain. More interested in owning one's own job, and that kind of thing.

Let me list a few more generalizations which have some value. The Big Generation is more interested in experiences. It is very clear that these people are less interested in possessions. It is, after all, the first and only affluent generation. If you are now in your twenties, the chances that you want to flaunt a red Buick in the driveway are quite small, although your parents may very well have done so. The chances that you might actually stand around washing it are zero.

Chances that you would care about what you looked like in terms of clothes are quite small. Travel to Hawaii or Tibet is a large status symbol. Drug experiences, sex experiences, the first concert The Who gave in North America, meeting Sting. Experiences, not possessions, give status

to the people of this generation. You can't nail any of those things on the wall. You can't shine them up and put them on the mantelpiece, but they are important.

The Big Generation is more interested in people and less interested in institutions. We are gradually going to see the end of the Royal Commissions.

We are in the presence of a large number of people who say that institutions are not the answer, they are the problem. These people are more interested, therefore, in personal privacy, less in institutional privacy. I remember that people used to say, "Of course, governments have got to have secrets. How else can they win the war?" Today they say, "Of course governments shouldn't have secrets. What are they doing? This is the Star Chamber."

I used to say, "I don't mind if anybody taps my telephone. I never say anything interesting anyway." The young people don't say that. They say, "I don't want anybody listening, particularly not those creeps from the Horse Brigade."

The Big Generation is more interested in the present and the future, cut off from the past and from tradition.

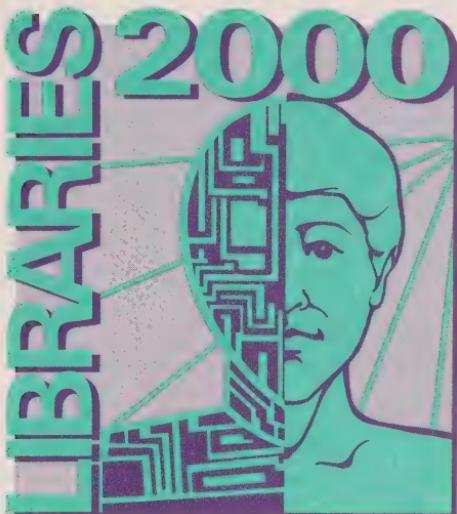
These are significant changes. We are looking at a generation that thinks in ways that are non-traditional, not the ways that were taught in the past, and that is going to dominate the society at least until the year 2000, and probably until the year 2030. In other words, these changes are not peripheral but central.

I would like to finish with two pictures that epitomize for me the feelings, activities, interests, and upbringing of the Big Generation. On the right: the modern workman, dealing with data, typically not word data but patterns that can be approached with a right brain point of view, can be studied for continuity, discontinuity and so on. Also, he is typically working as one person alone with or against the data, or playing games against self.

On the left, the other worker, somebody who is doing five things at once. She is taking a community college course, has just received her Walkman, is parenting, is going out for the ski team and, oh yes, has a part-time job.

These two people are what the future looks like. They are central members of the Big Generation. They are increasingly the people to whom you and your institutions will cater.

PREDICTIONS FOR THE INFORMATION-PROCESSING INDUSTRY



PREDICTIONS FOR THE INFORMATION-PROCESSING INDUSTRY

FRANK FEATHER



*Frank Feather is President of Global Management Bureau, consultants to multinational corporations and world governments on future trends and strategic implications. A former corporate planning executive, Mr. Feather's business career spanned 22 years with Barclays Bank, Toronto-Dominion Bank, and the Canadian Imperial Bank of Commerce. he has been featured in the **Globe and Mail** and **Toronto Star**. When the First Global Conference on the Future was held in Toronto in 1980 — the largest conference of its kind ever held — he served as Chairman and Director-General.*

Those organizations that most accurately assess and most effectively meet human needs will grow. If the libraries do not meet human needs, people won't go to the libraries. They'll go to video parlours.

This issue arose when video parlours were close to the schools, and some schools got up in arms, saying, "We don't want them here." Wrong move. They should have said, "Hey, bring the video thing into the school." That is what should have happened. We immediately put up our defences because we don't know how to deal with this threat. Those organizations that build their market share incrementally will survive all fallouts.

I'll quickly run by you five different types of information. A new book that all librarians should read is **The Gold-Collar Worker**. Blue collar, white collar, pink collar, gold collar. The gold collar worker is it: the knowledge worker. People who use and apply information can be divided into the gatherers, the expanders, the narrowers, the definers and the doers. You have to be able to cater to the needs of these different type of information participants.

In the information economy, information input is inversely related to the other resource inputs. All processes have been reversed. The more information we have about more efficient and effective ways of doing things, the fewer resources, natural resources and others, will be needed.

For example, an ingot of lead has a very high ratio of mass and precious little information. The video cassette recorder has a high ratio of information and not much mass.

It's the intellectual capital (true intelligent labour and intelligent management) that develops these products and services. Management of strategic information and people produces results. You have to invest in information, knowledge and people.

Then you will be able to command a higher market value and price for your services. Whether somebody is paying for those services or not, they appreciate the value they are getting if, in fact, they are receiving value.

In the electronic environment there is a whole new science called facilities management. I think librarians and library administrators should look at this type of management. You should examine how much it is costing you in rent and overhead to have one filing cabinet sitting in an office for a year. At King and Bay, the rent is at least \$500. Most of those filing cabinets contain garbage. We're paying \$500 a year to store garbage at King and Bay. How much are we paying to store garbage in libraries?

In the electronic environment, the workplace is anywhere. People can work at home as freelancers. I will go further than Marvin Cetron: a third of us will be working from home by the year 2000, and two-thirds of those workers will be doing so electronically.

The human brain and the mind are the new frontiers of economic activity. A nation which fails to invest in its people will perish. "The skill, dexterity and knowledge of a nation's people is the most powerful engine of its economic growth." That was written by Adam Smith, in a book called **The Wealth of Nations**, in 1776. Two hundred and nine years later, we need to understand that.

I want to discuss some implications. Number one, you have to develop and professionalize your information and knowledge, and make it available, in the best way possible, to the end user. It has to be in real time wherever possible. It has to be easy to access. It has to take place in the electronic world. It has to be available 24 hours a day in the electronic world. We heard today about the electronic librarian. We certainly have to have electronic libraries. You have to electrify all processes wherever possible. You have to determine which processes can be electrified.

You have to eliminate many other processes, such as filing cabinets. Don't store garbage. Ask some very serious questions about bricks and mortar. It took the banks ten years to determine that an automated banking machine didn't have to be in the wall of a branch. It could be in a department store; it could be in a bus station; it could be where people want it.

Secondly, you have to develop new customers. You have to invest in these customers. You may not want to call them customers. Call them clients, call them whatever you want, but that's what they are.

These customers, as the Minister pointed out this morning, are now multicultural in Ontario. This isn't WASP-land any more. We also have the issue of francophone services. Are you providing those?

We agreed not to talk about marketing. I'm sorry, you have to learn to segment the market. I'll leave it at that.

You cannot be all things to all people in the same way. If you do, you go down the tubes like any unsuccessful commercial enterprises. You have to try to offer tailor-made services. People want individualized, packaged information and knowledge. Everybody's needs are different.

You have to be user-friendly, whether it's human or technological distribution of information.

And you have to come to grips with this issue of whether to charge or not to charge. Are we going to have an information rich-poor gap in Ontario or not? The gap can be eliminated. You can provide information services free. That doesn't stop you from charging for some services. There's no way that I should be allowed to walk into a library and demand a librarian's time for two hours to do bibliographical research and come up with all this material that I'm going to sell to the Ministry of Culture and Recreation, or whatever it's called these days, for five or ten thousand dollars. It's coming out of your own system. But that is what consultants are doing. I shouldn't be saying that, because I can get all this wonderful, free information. But you are stupid if you don't charge for it. You have got to find ways of raising revenue to offset the tax dollars that might not be available.

The third implication. We haven't heard very much about employees today, these wonderful librarians, where the power is and so on. Based on the interaction I've enjoyed today, it seems to me that this is a pretty humane organization, which is more than can be said for many bureaucratic organizations. But you have to be able to encourage innovation as a result of this kind of soul searching and questioning.

You have to encourage, in your own way, "inter-preneurialism". Foster a creative environment, and the ideas will flow. Ideas are the most powerful weapons that anybody has.

You have to try to encourage people to be futuristic, to think forward. Get them to anticipate. The year 2000, the theme of this conference, is not Arthur C. Clarke's 2001 science fiction, space-age stuff a long way away. Do you know that the year 2000 is 5,500 days away? That includes weekends, holidays and conference days. There isn't much time.

You have to encourage people to be creative. You have to invest in people instead of investing in books, which are obsolete. Weed the books, and buy the bestsellers, the active items. Use Pareto's Law: centralize essential sources and have selected items available in other locations. Invest in people: train them, retrain them. You don't have to become computer programmers. Invest in intellectual capital and become a learning institution. Become aware, become pro-active, not reactive.

Point number four is that you are sitting on a gold-mine, but you don't know what to do about it. You don't even realize you have this gold-mine, because it is in such a mess. The whole entrance of the mine shaft is

cluttered up, and all these nuggets are sitting on shelves and on microfiche and on tapes. We have to pull those nuggets out, make them into something malleable, turn them into shining pieces of jewellery. That's what the knowledge bank of this province is all about.

We have to decide how to exploit this gold-mine. There is nothing wrong or capitalistic about that. It makes good sense.

In terms of budgets, you have to have program budgets. You have to have zero-based budgeting, not incrementalism. Get rid of the idea that if you don't use up the budget, you won't get it next year. You have to change the mentality at both ends of the spectrum.

Number five. I think there was a fantastic idea this afternoon that I must endorse. People love pilot programs. They are not threatening. You can dip your toes in the water on a low budget, and not go system wide. I challenge you to take this initiative and create a pilot library, more than one if possible, but at least one somewhere in Ontario. Create a library that is the futuristic library not only of Ontario, not only of Canada, not only of North America, but the most futuristic library in the world. Why not?

Make this library a responsive learning centre. Make it high tech, high touch. In that library, somehow solve the rich-poor information gap. In that library, deal with all the issues that you've been dealing with today. I'd make a further plea that the library be decentralized and user-friendly.

Those are my five implications. I have one final challenge, which I think incorporates all of these.

I don't know how many of you are familiar with an experiment which has become a resounding success in the country of Venezuela. This experiment has taken place primarily in the education sector, but I have campaigned this among educational audiences across this country and nobody has yet picked up the challenge. Maybe librarians can do it.

Venezuela decided in 1980 or thereabouts to create a federal ministry for the development of human intelligence, the first such position created in the entire world. Venezuela established a national goal of using creative thinking programs and similar techniques to have the country become more known for its brain power than for its oil by 1990. In the first four years, Venezuela has trained 102,000 teachers. There are two million students a year going through this new educational program. They have reduced the illiteracy rate from 60 to 40 per cent. It is working.

I would like somebody to take up the challenge to make Ontario known, before the year 2000, more for its intellectual capital than for anything else. Do it in a high-tech, high-touch way, and do it by not having an information rich-poor gap. I think libraries should do that.

Another quotation. T.S. Eliot said, "Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information?" We are suffering from a knowledge explosion and from information overload. And I've certainly added to that today.

By thinking in a different way, we can sort the wheat from the chaff, and we can accomplish more astute information and knowledge management. I believe that you are up to the challenge or you wouldn't be attending this conference. I believe that you can meet it successfully and, as the Minister said, in a professional way.

Dame Barbara Ward used to challenge people to be headstrong. I challenge you to be headstrong. Canadians do not lack confidence about themselves. We can be headstrong in a better way than the Americans can.

But you have to have the courage to do that. You cannot remain wedded to the past. There is nothing sacred about today's institutions, libraries or anything else. They were all created by human imagination. Surely they can be changed by human imagination.

I challenge you to re-invent the library, to re-invent your profession, and to do it with high technology, with a human face, with a smile. I think it will be a lot of fun. We are living in exciting times, and I want to see you do it.

CLOSING REMARKS



RANDOLPH NORBERG
ASSISTANT DEPUTY MINISTER
ONTARIO MINISTRY OF CITIZENSHIP
AND CULTURE

I think a lot of questions have been answered today, and I'm sure for many, even most of us, some questions have been left unanswered. A lot of information has been put in front of us.

I think we're all going to be asking as we leave here, as our heads clear tomorrow morning, what happens now? Where do we go from here?

We in the Ministry are very pleased that the Ontario Library Association has chosen the theme from this symposium for its conference this November, and I think that we all agree that is a crucial next step.

I want you to know that the Ministry intends to work with the Ontario Library Service to workshop the Libraries 2000 theme and to publish today's proceedings. You'll be able to go over much of this material with your colleagues and with your board. I think these efforts will be an important step in continuing the dialogue that we have started today.

I think it is critical that each of us feels the momentum started by this symposium and participates fully in this debate by taking it back to our colleagues, our boards and to our communities.

I think this day has helped us to appreciate more clearly than ever the fact that library services are too critical an institution in Canadian society to risk the "business as usual" approach. As we heard today, events, whether they are results of economic, technological or demographic trends, are dictating that public libraries change to continue being relevant and responsive to the community. The challenge is there, but so is the opportunity. And the groundwork was started in 1882 with the Free Public Libraries Act.

Ladies and gentlemen, we look forward to working with you in the future, and we hope that this conference has been valuable to all of you. We hope that it marks a real beginning.

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Ontario Ministry Lily Munro
of Citizenship Minister
and Culture